The International Journal of
Orthodontia, Oral Surgery and Radiography

VOL. XI ST. LOUIS, JULY, 1925 No. 7

ORIGINAL ARTICLES

MALOCCLUSION OF THE TEETH REGARDED AS A PROBLEM IN CONNECTION WITH THE APICAL BASE*

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INTRODUCTION

IN accordance with the generally accepted custom the bandlike area extending along the dental arch and alveolar process parallel to the crowns of the teeth and the alveolar process may be called the dentofacial zone. This zone is divided into an apical and a coronal zone, the former being described as "the narrow bandlike area extending along the gingivae, parallel to the apices of the teeth" (Ottofy).[64]† According to this nomenclature the term apical zone would appear to be limited to buccal and labial surfaces. We are, however, doubtless entitled to extend the use of this term to the corresponding inner surfaces of the alveolar process and its immediate surrounding regions, and consequently we assume the existence of a lingual and a palatal apical zone. We have, therefore, two apical zones, one external and one internal. The immediately adjoining section, upon which the region that is limited by the apical zones rests or to which it is attached, may be called the apical base.

The alveolar process has been regarded as a region in certain respects independent of the jawbones and intimately connected with the presence of the teeth. From the description, however, of certain peculiarities in the pathological anatomy of the region in question, it would appear that the alveolar process and the position of the teeth are dependent upon the form of the apical base. When the latter is normal, and only then, is a normal position and a normal occlusion of the teeth possible.

*Reprinted from Svensk Tandläkare Tidskrift, 1923.
†References will be published at end of article in last installment.

When the teeth are lost the alveolar process gradually disappears, in many instances so completely, that not even a crest remains. It does not appear to be quite conclusively proved whether the apical base itself becomes reduced in size, but it is certain that, as long as anything remains of the alveolar crest of the upper jaw, it constitutes a smaller arc than the original apical base, which results from the fact that the outer, thinner alveolar plate is resorbed to a greater extent than the inner one (Cryer).[20]

The loss of teeth is followed by the final disappearance of the alveolar process and may also possibly affect the apical base. But it does not follow

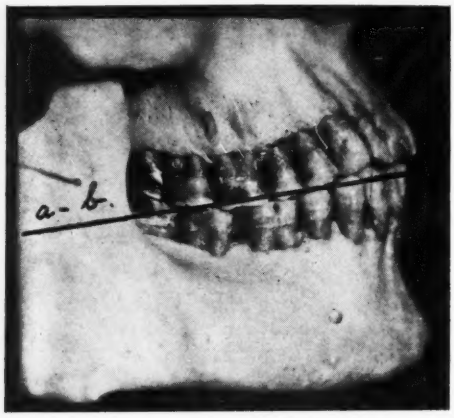

Fig. 1.

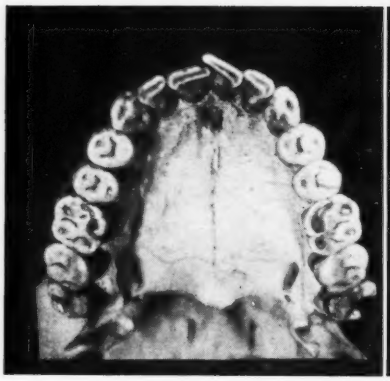

Fig. 2.

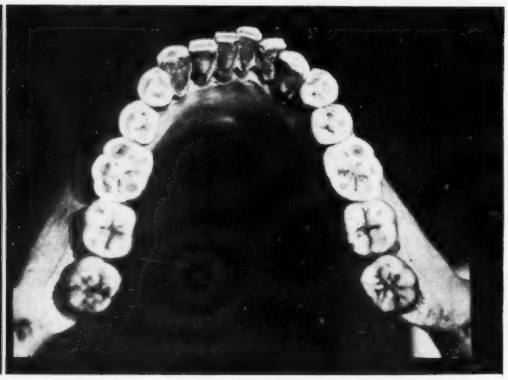

Fig. 3.

from this that a correction of an anomaly in the position of the teeth that is coexistent with an abnormal apical base, will also have the effect of changing the latter to normal. It is this false conclusion that constitutes the theoretical foundation of the doctrine of functional activity in orthodontics. From a therapeutic point of view this theory regards the irregularities of the teeth as being exclusively a problem of occlusion and according to its teachings the attainment of normal occlusion is accompanied by the possibility that through the medium of muscle activity the apical base will also become affected, with the result that the latter will harmonize with the new configuration of the dental arches, obtained by orthodontical treatment.

From our definition it will doubtless be clear that in normal cases the apical

base will in the horizontal plane coincide with the region in which the apices of the roots are located. Figs. 1, 2, 3 show an approximately normal denture. Figs. 4 and 5 show the position of the apices in the upper and the lower jaw of the same specimen, projected at right angles against the plane a—b in Fig. 1. From the comparison with Fig. 6 it will be seen that the apical curves differ considerably both from the coronal curves and from each other.

The distribution of the bony substance of the alveolar process that has come into existence and become fixed through phylogenetic evolution, and which is well adapted to stand the stress of mastication, has taken a different form in the different sections of the denture. A certain thickness and strength in the alveolar process is necessary. The distribution and position of those parts, that have to receive the main stress, vary considerably in different locations. Skinner and Dewey[80] have drawn our attention to this circumstance in certain animals. In reality it is very prominent also in man. The main resistance against a dislocation of the upper anterior teeth is provided by the bony structure of the palatal apical zone. A dislocation of the opposing teeth is resisted by the bone of the lingual zone. As the stress is in an opposite direction in the case of

Fig. 4.

Fig. 5.

these two groups the chief attachment will serve as a resistance, in the former case against traction, in the latter against pressure. It is not possible from the direction of the stress to which a tooth is subjected to draw any conclusion as to the location of the strongest portion of the alveolar process, that is to say, as to whether the latter chiefly serves as a resistance against pressure or against traction. This has been effected through phylogenetic evolution in such a manner that the main apposition of bone is to be found in such positions as from other causes prove most expedient. Especially worthy of notice is the fact that, as a rule, in man a certain amount of bone is to be found in the extensions of the roots. There are, however, exceptions to this rule, for instance, the apices of certain of the upper teeth may be located in the antrum.

Apparently, it is only in exceptional cases that the direction of stress in mastication is from the occlusal surface towards the apex of the tooth. There are examples of this condition, as is the case of the genus Cynocephalus. The formation of bone in the extension of the roots of the upper molars in this animal is reduced to a minimum, and this is the case also with the palatine root. From this it would appear that the presence of bone about the apices in man does not form any resistance against the stress of mastication, but is caused by

other conditions. This is supported by the investigations of Weski[93] concerning the direction of the fibres in different portions of the peridental membrane. The peridental membrane, according to this author, is not to be regarded as a cushion that reduces the shock of mastication, but as an apparatus of suspension, in which the direction of the various groups of fibres correspond to the directions of the various stresses to which the tooth is subject. Their directions at the apex are adapted to prevent the withdrawal of the tooth from the alveolus.

A dental arch cannot be normal in form unless there is a definite relation between the coronal and the apical curve, the relation being dependent upon the type of tooth in question. If the crowns of the incisors are more or less at an angle to the root as is the case with Simia satyrus, the disproportion will be greater between the two curves. As in man the crowns of the temporary teeth are less characterized by an angular inclination towards the roots than those

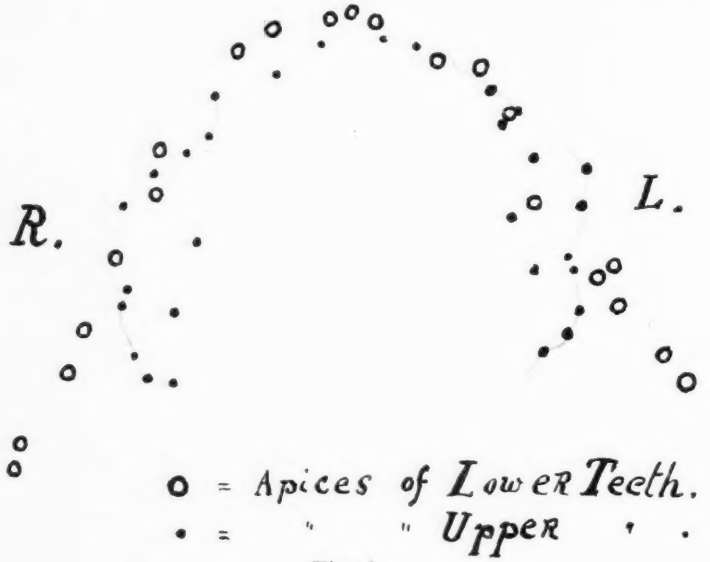

Fig. 6.

of the permanent teeth, the two curves will differ less in an individual with a temporary denture than will be the case with the same subject after the permanent teeth are in position. In different abnormal formations of the apical base the distances between the apices of the roots will be too large or too small.

The modern textbooks on the mechanical treatment of malocclusions have devoted considerable space to the causes of these anomalies. Among such causes are enumerated heredity, congenital conditions, results of constitutional diseases, abnormal endocrine conditions, faulty diet, etc. But as the authors go on to describe the treatment, they ignore these causes, and confine themselves to the description of mechanical methods. The classifications of malocclusion are arranged in such a manner, that from the diagnosis that is based on them only can be gathered, what changes in the positions of the teeth are to be effected, and the rules for treatment indicate how this can be accomplished by mechanical means. It has been acknowledged that the causes of the malpositions of the teeth are by no means uniform, some of them being caused by purely mechanical

factors, others being the results of the most deep-seated causes; but in spite of this the treatment recommended is in both cases the same. As a result of this the opinion has widely prevailed that as soon as a case of irregularity of the teeth, which from a functional point of view can be considered as a malocclusion, though orthodontic treatment ceases to be so, then the best therapeutic steps have been taken, and our confidence in normal occlusion has become so unlimited, that we have imagined it capable of controlling the position of the teeth.

This mechanical view of the treatment of abnormal conditions, the greatly varying characteristics of which must have become apparent to all who have to any considerable extent devoted themselves to the study of them, has doubtless been the cause of many humiliating disappointments. The author has long been aware of the fact that the still prevalent and widely disseminated theories are erroneous. He has long been expecting that some competent orthodontist living in a country, which offers good opportunities for the interchange of experiences, would present to the profession ideas similar to those it is here proposed to publish. But textbooks having appeared one after another with misleading statements concerning the treatment of malocclusion, he has decided to hesitate no longer, in the hope of thereby sparing to some extent patients and operators the disappointments that are inevitable, if textbooks with the reputation of being up-to-date are used for instruction, and of possibly inducing their authors to take into consideration in future editions experience and reason rather than dogmas that are not substantiated by evidence.

The prevailing teaching, at least so far as is apparent from the study of modern textbooks, aims at attaining some special form of occlusion, normal or abnormal, and considers this occlusion as an almost infallible, or at least as the most reliable, means of obtaining such functional efficiency, that both factors will be sufficient to ensure a permanent result. In opposition to this teaching reasons will be advanced in this treatise for the opinion that in a considerable number of cases of malocclusion the positions of the teeth are to be considered as secondary factors.

The views presented in this treatise are founded on data obtained in the author's practice. The number of cases treated was 650, of which 165 have been selected as especially suitable, as the last examinations have been made when a sufficient time had elapsed after the removal of the retainers to warrant that the result may be considered permanent.

The statement that the degree of abrasion of the temporary molars in the cases shown in Figs. 66 and 67 is to be considered as more than normal is founded on an examination of the abrasion of the temporary teeth in 170 cases, of which fifty-four have a normal apical base.

The orthodontic experiments have been carried out according to the directions of Angle as published in his textbooks and other publications. His well-known appliances have been used.

The projection drawings have been executed with the apparatus constructed by Franke and according to his directions.

The author wishes to express his sincere thanks to the following: Professor W. Leche, Professor A. V. Sahlstedt, Professor E. Agduhr and Mr. O. Roth,

who have in various ways facilitated this work; to the Dental Society of Sweden, from which he had the honor of receiving financial aid for the completion of the work, and to the Editor of this Society's Journal, Mr. B. Östman, for the cheerfulness with which he has complied with his wishes concerning the printing and general get-up of the treatise. Finally, it is a pleasure for him to here acknowledge his obligations to Miss Dagmar Lagerlöw for her valuable assistance, especially as regards the excellent execution of the models.

I. History

The student of the literature of a past age on the nature of the irregularities of the teeth will find that it was formerly the general custom to regard the crowded position of the teeth as secondary results of a narrowness in the region of the apical base. It is difficult to resist the impression that the theory that is now prevailing has arisen under the influence of the imposing progress made in the mechanical treatment. In spite of their, in many cases, excellent general education, their interest in general medicine and natural science, the therapeutic powers of the operators have been confined to what they could achieve by means of their hands. It seems probable that the writers of the history of our specialty will in the future regard the period now come to an end as the era of the grand mechanical-orthodontic inventions, and that its teachings will be of interest less as being of general application than because of the great influence they have exerted both as regards the treatment of malocclusion and the general practice of the art of dentistry. Already it is possible to observe the salutary reaction they have exercised against excessive indulgence in the ruthless extraction of teeth, which was once the practice, and through teaching the individual to understand the value of every single tooth both for the denture as a whole and for the symmetry of the face they have rendered the advocates of general mouth hygiene valuable assistance.

The dental authors of the nineteenth century have taken considerable interest in the crowded position of the teeth, and their views may be of some interest in this connection. As early as that period, opinions were advanced concerning the nature of these anomalies. According to Weinberger[90] it was Maury's opinion that the jaws are too narrow to allow a normal position of the teeth. Similar views were, according to the same author, held by Jobson (1834), Imrie (1834), Saunders (1844), and J. Tomes (1847).

As it is impossible for us to ascertain what varieties of crowded positions they have had in view, we have now no means to decide whether their opinions were correct according to modern ideas. But even should this be the case, it must have been a pure accident. At the time in question the orthodontic appliances were in so imperfect a stage of development that it was quite impossible to carry out such experiments as would be necessary for purposes of evidence. To them a crowded arch appeared to be the result of a narrowness of the jawbones, but they had never tried to expand the narrow basal region by mechanical means for the reason that no suitable appliances were yet designed for such experiments.

Further, we are entitled to assume that each observer had only a comparatively insignificant number of cases at his disposal. The different views of the

different authors confirm this. Lefoulon (1841) states, according to Weinberger,[90] that the alveolar arch may be expanded, while it was Talma's opinion, that this narrowness may be neutralized through natural growth; whence it follows that he must have noticed some such cases. It is evident from many of the statements that the authors instinctively had a presentiment that the malpositions of the teeth are expressions of faulty development. The general position of medicine at that time prohibited the collection of reliable data for a further investigation into the causes of the irregularities of the teeth, and the establishment of a therapy based on evidence furnished by such an investigation. The dental surgeons of that time were engaged in practicing an art consisting mainly of manual work. Naturally, the profession was chiefly composed of individuals of a mechanical turn of mind who also took a mechanical view of their sphere of action. Therapeutic measures would accordingly be limited to a great extent to mechanical treatments.

It is not known when this originated, but Weinberger[90] states that it appears from the writings of Fauchard that mechanical orthodontics had attained a certain stage of development even before his time, and that the methods he describes have previously been used by other operators. From these unknown men we may date the origin of the long process of development that has been going on right up to our own time, and that has now attained a degree of perfection which it seems difficult to surpass as far as purely mechanical efficiency is concerned.

The chief aim of orthodontia was originally to "straighten irregular teeth," and only in exceptional cases were the antagonizing teeth taken into consideration. Angle[45] established the dictum that the irregularities of the teeth were problems of occlusion, and he worked out a system of treatment so perfect, as regards the possibilities of effecting the most varied movements of the malposed teeth, that these possibilities appeared to be limited only by the ability of the operator to master the technique. Some time before Davenport[21] had laid stress upon the functional superiority of the normal occlusion. Angle[3] demonstrated the possibility of placing the teeth in normal occlusion in a number of difficult cases of various kinds. Progress having advanced so far that it appeared probable that an ideal functional result could be attained with the aid of mechanical and not exceptionally difficult methods, a firm foundation seemed to have been laid for the specialty of orthodontia.

One of the reasons why the early conception of the irregularities of the teeth as being something other than dento-functional problems had been disregarded to such a great extent is probably the fact that progressive men, being completely dominated by the influence of Angle, had begun to operate according to his teachings. In consequence of the protracted period necessary for the treatments it took a long time before the exaggerations of the theory became fully evident. Angle's great authority is well illustrated in a review of his textbook by Zielinsky. The reviewer has some misgivings with regard to the compensating growth of the apical base as a result of treatment, but explicitly says that it did not behoove him to doubt the statements of so experienced a practitioner. Time has shown that Zielinsky's misgivings have been amply confirmed.

On the whole, the orthodontic literature since about the year 1900, proves that the authors are followers of Angle in regard to the nature of the irregularities of the teeth and their treatment. The most recent textbooks differ from these theories only in unimportant details.

At the annual meeting of the American Society of Orthodontists, held in 1905, a paper was read by Brady[16] on "The Influence of Heredity and Malocclusion." This paper is of considerable interest, as it gives a good idea of what was the prevailing opinion concerning the nature of the malocclusions among the adherents of the then comparatively new Angle teaching. At this meeting Brady made the following statement: "* * * the greatest factor in the development of the dental arches comes from the stimulation to the parts that normal use gives, and it is from this that normal growth is most promoted and finally attained. * * * Pressure upon the teeth means * * * blood supply, nutrition, growth. Lack of full use means lack of these things * * * and contraction of the arch results. * * * We have been wrong in the belief that the size of the dental arch depends upon the size of the jaws * * * the size of the jaws is influenced by the development of the dental arch rather than the reverse."

The treatment of the malocclusions of the teeth was influenced by this theory according to the following argument: Irregularities of the teeth are problems of occlusion. Normal occlusion is functionally the most effective. To attain normal occlusion is, therefore, the aim of the orthodontic treatment. If we have succeeded in doing this and the patient has acquired the habit of using his masticating apparatus with sufficient vigor, the result will be permanent and the surrounding parts will be normally developed.

Among the opponents to the teaching that the full complement of teeth is to be retained in the orthodontic treatments, Case[17] occupied a prominent position. He stated expressly that in his opinion the time was not far off, when the normal occlusion dogma would be considered as one of the great retarding forces in the sound development of orthodontia. He opposed the theory of "bone-growing," which he considered incorrect. With regard to this theory he wrote (l. c. p. 29): "While the rapidity of their early growth may be hastened, and while inhibited developments may be stimulated to normal growth, and while the forms of the bones may be varied slightly by bending, it is contrary to the laws of biology that environing forces, or any kind of artificial stimulation has the power to cause them to grow interstitially larger than their inherent normal size." In the same work of this author we are given to undertsand (p. 79) in regard to the treatment of "constricted arches": "* * * the dental arches can always be sufficiently enlarged to place all the teeth in alignment and in normal occlusion if demanded, however, extensively malposed." According to this, "bone-growing" would occur in these latter cases. His methods of treating several varieties of "retrusion" show very clearly that in spite of his former statement concerning the impossibility of causing a bone to exceed its, as he expressed it, "inherent normal size," in practice he allowed himself to be governed by the conviction that teeth that have been moved by orthodontic methods influence and direct the development of the surrounding parts. In these cases of "retrusion" an abnormal

occlusion which he himself had brought about would have this effect, for in certain cases where the occlusion was originally normal he recommends an expansion in an anterior direction by the width of one premolar or even more, and afterwards closing the spaces with artificial teeth. Although Case, in certain details of practice sharply opposed the methods of the occlusion school, he must yet be considered as the most extreme adherent of the trend of opinion, that still dominates our literature, and that considers an artificially effected movement of the teeth capable of influencing the surrounding parts to such a degree that the latter accommodate themselves to the new position of the teeth. Through this a new functional optimum is attained, or, in other words, occlusional conditions are capable of determining the apical base by functional means. The one trend of opinion considers a normal occlusion attained by orthodontic means, the other an abnormal occlusion attained by orthodontic means capable of directing the development of the apical base. We are, therefore, entitled to consider them as practically of the same opinion in this fundamental matter. Since, therefore, the chief opponent of the operative methods of the occlusion school differed in fundamentals only in being somewhat more extreme than the opponents, the dominating influence of this theory is clearly evident.

But although the so to speak official theory of the occlusionists has in the past dominated our literature, we may find several instances of expressions of doubt concerning the general applicability of their methods. It is especially in two respects that the prevailing ideas have been shown to require modifying, partly as regards the compensating growth of the apical base following an expansion, and partly with reference to the retention of the teeth in their corrected positions.

The discovery that normal occlusion would not in every case be succeeded by a spontaneous development of the apical base was made by Angle.[6] At an earlier date he had been teaching that a similar growth would occur after a tipping of the crowns of the teeth to an approximately normal cuspal occlusion and he had also published reliable reproductions of some remarkable cases, in which this really had occurred. Soon, however, he made the discovery that he could not be sure that this always would be the case. He then made a radical change in the method of treatment and adopted the apical expansion, which operation had been performed by Case since 1892 with very different appliances, although the principles had been the same. "Bodily movement" is still considered by the most orthodox of Angle's followers to be absolutely necessary, as it is supposed to be demanded for certain physiological and mechanical reasons, for instance by Strang.[81] The opinions at the different dates conform in this, that normal occlusion was in both cases the objective of treatment; they differ in this respect, that while according to the earlier trend of opinion, a tipping was all that was necessary; more recent opinion requires bodily movement; both assume that the retention of the teeth in the new position is a result of the functional activity of mastication, or as it may be expressed, the size of the dental arch determines the size of the apical base.

Doubts concerning the influence of normal occlusion in retaining an expan-

sion that had been attained by mechanical methods have by no means been absent from our literature. One of the earliest expressions of this feeling came from Wallace:[87] "How the arch of the teeth could be expanded and expected to remain in the expanded position without the pressure of a correspondingly augmented tongue is one of the strangest expectations which any class of mechanical men have yet harbored" (l. c. p. 124). Wallace's criticism, which as is now apparent was very well-founded, did not produce the desired effect. One of the reasons for this is probably the fact that Wallace himself provided the adherents of the normal occlusion theory with a new theory of functional influence. This new theory was founded on a quite different argumentation, but could still encourage the optimists in their conviction as to the permanency of the results of the treatment that had been based on the theory. He taught that the exercise of the tongue during mastication would effect a development of its muscles, the result being a pressure from inside expanding the dental arches. The result would be practically the same, although the explanation was different.

A considerable number of practitioners of orthodontia declared themselves in short articles and discussions in favor of the theory that the function of mastication will effect the retention of expanded dental arches, provided that the function has developed the full use of the masticating apparatus. Among these we may mention Summa,[82] Pullen,[68] Brady,[16] Hartz,[30] Watson,[88] Kemple,[42] Baker,[8] Zielinsky,[98] Walkhoff,[86] Hawley,[32] Herbst,[36] Dewey,[23] White,[94] Case,[17] Pfaff,[65] Rogers,[70, 71, 72] Körbitz,[46] Federspiel.[24] Of these Pullen, Hawley, Kemple and Federspiel have later modified their position. Among scientists attributing to mastication a powerful influence on the individual development of the jaws, Franke[25] is worthy of receiving especial mention. These authors have for the most part made no attempt to prove their views by means of experiments, nor have they as a rule mentioned any facts that could confirm them. Exceptions from this rule are Baker, Rogers, Dewey and Franke.

For a number of years practice was based on the hypothesis that malocclusions of the teeth were the result of insufficient functional activity. It gradually became possible to obtain a summary of the results of this treatment, and it became clear that there was something wrong with the theory and that the accepted ideas concerning the etiology, which had been the foundation of the methods of treatment, were not correct. As more or less conscious opponents we may note Cryer,[19] Young,[96] Federspiel,[24] Lourie,[53] Kemple,[43] Grieves,[28] Pullen,[65] Weinberger,[92] Johnson,[49, 50] Mershon,[60] Preiswerk-Maggi,[67] Zsigmondy,[100] Mayer[57] and Bennet.[13]

An opponent to the theory of the pressure of mastication acting on the teeth as causing the development of the jaws is Landsberger,[45] who based his idea on experiments.

The incorporation of the apical expansion into the Angle system indicates that Angle's doctrine that a spontaneous apical development would arise as a result of the coronal expansion was finally abandoned. But there still remains the rule for the treatment of the crowded dental arches, that they are to be

expanded so as to accommodate the sum of the mesiodistal diameters of the whole complement of teeth. But even this rule is not reliable. In the year 1912, Young[96] declared that it was impossible to guarantee a permanent result from a correction of the teeth of the lower jaw after their full eruption, and stated on the same occasion that a retention period of three months was sufficient for teeth that had been rotated during eruption. The following year[97] he described the treatment of a case, in which the limit of retainable orthodontic expansion had been exceeded, although the treatment had been pursued absolutely lege artis by aid of apical expansion. He did, however, not on that occasion give his opinion against the method, his report of the case showing that he only considered that the treatment had been concluded prematurely.

Doubtless the practicing orthodontists have to a great extent found by experience that Wallace was right. But we do not find many direct accounts of the fact in our journals. If we imagined an operator studying for the practice of orthodontia, having as his sole authority the technical literature, the textbooks and society proceedings, it is highly probable that he would follow the directions of the occlusionists and believe that normal occlusion was the only aim worth attaining. The opposition to this school of thought has appeared much more in the form of theoretical arguments. It has not been openly declared that the occlusion theory is contrary to experience and consequently must be false. Instead of this it has been customary to omit mentioning these experiences and to look for other means of explaining the reasons for contracted dentures. Federspiel[24] is of the opinion that the forces of normal eruption and normal occlusion are controlled by internal secretion, although he also considers external and internal muscle pressure as active factors. Grieves[28] is also of the opinion that internal secretion is active, but believes that the mechanical expansion of the dental arch may affect the pituitary gland. The possibility of an anomaly in the position of the teeth arising in the prenatal stage of development has been suggested by Zsigmondy,[100] Thourén,[84] and Weinberger,[92] who have demonstrated prenatal conditions which seem to be predisposing causes of malocclusions. Amongst those who have most clearly objected to the theory of occlusion may be mentioned Johnson[49] and Mershon.[60] Johnson says: "* * * the masticatory apparatus * * * is controlled in its growth and development by the same factors which control the growth and development of the organism as a whole," but adds that a certain mechanical influence may bring about a modification. He has also introduced the excellent term, "the individual normal"[50] and defines it as "the most perfect condition of occlusion that the nature of the tissues and the functional activities of the organism as a whole will permit." But he does not deny that function is an active factor.

Mershon[60] has declared explicity that "the orthodontic problem is not a tooth problem and, consequently, is not primarily a problem of occlusion, but it must be studied from the standpoint of development and its relation to the functional forces," from which statement it appears that he considers function as an important factor. Accordingly, he suggests that "in selecting an appliance, the first requisite is that it must not interfere with the function of

the teeth or any of the associated tissues or organs of the oral cavity'' (l. c. p. 683).

The expressions of opinion of these last authors demonstrate clearly that the theory, according to which the treatment of malocclusion is to be regarded as a mechanical and functional problem, is losing its authority. It is still so prevalent and has the support of so many leading authorities that it would seem of interest to analyze its theoretical foundation from a practical-orthodontic point of view. Should this foundation be proved untenable the present working hypothesis of orthodontia will have to be subjected to a radical revision.

(To be continued.)

FACIAL MUSCLE ACTION AS CONNECTED WITH ORTHODONTIC TREATMENT*

By Homer B. Robison, D.D.S., Great Bend, Kansas

THIS paper was primarily arranged for an audience of physicians and rhinologists as well as orthodontists and if there are parts that seem somewhat primary to the orthodontist, please overlook them.

I wish to acknowledge my indebtedness to Dr. J. G. Janney for his inspiration and assistance, and to Mr. C. M. Drennan, Superintendent of the School for Feeble-minded at Winfield, Kansas, and especially to Miss Dorothy Triplett, Psychologist of the Institution whose untiring assistance and knowledge of the inmates added so much to my findings.

Through all the centuries of construction and destruction imposed by man, with all the rapid advancement of science, she has merely harnessed, harmonized or put into action the materials which the Divine Architect has furnished. And by the correlation of the elements we have revolutionized the world, both to the betterment and detriment of mankind. The constructive has been formulated according to the divine plan, the destructive has been an abuse of it. No matter how much man may endeavor, he will never change the fundamental principles of the laws of nature. Every living thing from the lowest to the highest has a definite form and will conform to a certain harmonious proportion if it is not encroached upon.

The tree that stands alone, unmolested, will develop a beautiful, symmetrical, oval-shaped top, its branches so placed that they form a perfect fortress from the wind and seldom if ever will you see such a tree destroyed by the average storm; but each tree will be formed according to its definite shape or plan.

We must all agree that if the laws of nature are obeyed, all parts of the body work in perfect harmony and any deviation from the normal is a violation of the laws of nature and causes some malformation which in turn will affect all of its associated parts and thus we eventually have a disarrangement

*Read before the Southwestern Society of Orthodontists, Tulsa, Okla., April, 8 to 11, 1925.

of the entire body. As orthodontia is dealing with the abnormality of the arches, I will attempt to show that without a harmonious functioning of all associated parts, a successful termination is impossible and it is with this view in mind that I bring you my findings and conclusions, and as the specialist is accused of being biased and possibly justly so, still I have endeavored to take a broad view of the situation.

I do not proclaim this brief the last word on the subject, but rather intend it as a means to an end that will start us thinking along these lines and enable us to correct the obvious mistake we are making.

The head and neck are such a network of various tissues involving

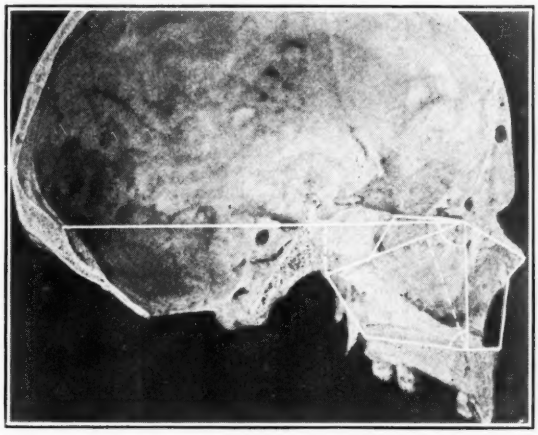

Fig. 1. (After Pitkin.)

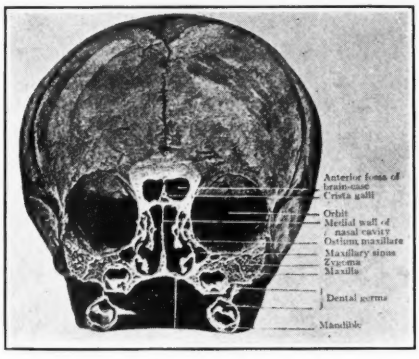

Fig. 2. (After Gayer.)

numerous sinuses, glands, and assisting so many varied functions (or functioning organs) that it is hard to determine just what or how many are responsible for the various malformations, but they do exist and we have failed to get results in many cases by operating some one of the many parts and disregarding others.

I will endeavor to show the different parts of the head and neck that are affected by mouth-breathing. We will first take up that portion of the maxillary bones that form the roof of the mouth and the floor of the nose. Dewey states, "It has long been recognized that there is a relation existing between malocclusion of the teeth and deformities of the nasal cavity, but

there has been some dispute in regard to what relation one has to the other and which is the causative factor and which is the effect. In considering the etiology of malocclusion, we have learned that a certain number of malocclusions are caused by mouth-breathing, which is produced by abnormal forces of occlusion that result from a disturbed function of the muscles and abnormal atmospheric pressure." Thus we can readily see when the pressure is reversed and the orbicularis oris is shortened and lies above the teeth, as you will see in some of the accompanying illustrations, all forces being anterior, the teeth drift forward and to attempt to right this condition by merely widening the arch would meet with failure. Likewise it is just as impossible to gain a normal condition with diseased adenoids and tonsils present; for if the nasal passages are widened to sufficient size and there is a stoppage of the naris, admitting only a portion of the air necessary, the mouth will be resorted to for breathing space, thus averaging the air pressure and interfering with

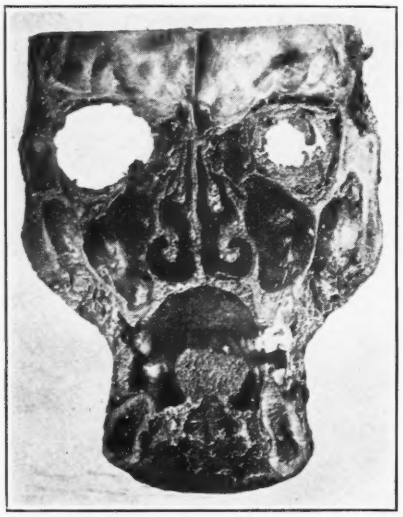

Fig. 3. (After Dewey.)

normalization. The same thing is true of removing the adenoids and leaving a narrow arch, collapsed alien cartilage, and short vertical diameter of the septal cartilage. These must all be normalized before we have a satisfactory result.

There is an article by Carlos E. Pitkin, who made an analytic study of one thousand skulls as he found them and it is of so vital importance to the orthodontists that I am giving his summary in full.

SUMMARY*

"1. Previous investigations upon nasal form have embodied mainly the following up of clues derived from observation of individual specimens.

"The time is ripe for an investigation based rather upon samples of population. By this method individual differences find their appropriate place

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and do not preoccupy the mind. Statistical theory is involved in such a mode of attack.

"2. Upon the average, a nose which lies more under the cranium than in front of it shows a greater tendency to disharmony of nasal form, one of the indications of which is a deflected septum.

"3. Individual variation in nasal form is somewhat greater than cranial variation and much greater than bodily variation as a whole. We gather that mutual compensations occur in the form of constituent parts of any portion of the body, and for the nose these compensations must be sought either within the nose itself, or in neighboring parts of the skull.

"4. From a study of the general relations of the nose, it appears that an internal nasal compensation can be discerned in the relation of nasal floor to

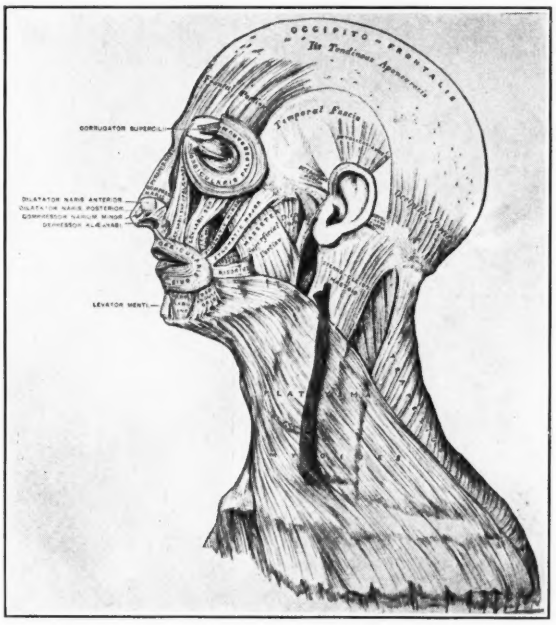

Fig. 4. (After Gray.)

cerebral base line. It seems, further, that in a series of noses shown to be abnormal by the presence of septal deflection, this compensation is rather exaggerated, and the exaggeration may itself in part be the cause of the abnormal condition.

"5. External compensation is also found in the relations of nasal and posterior components of cranial length. The effect of failure in this external compensation would appear to influence largely the size of the nasopharynx.

"6. The external nose—that is, the part projecting upon the face—has a variability largely independent of cranial factors. The internal nose, that buried within the face, on the contrary, is greatly influenced by cranial form. There is some evidence that unnatural cramping occurs in certain noses in which deflected septum is a feature. And it is plain that the focus of disharmony is to be found in the area near the incisive foramen.

"7. Even the preliminary results already obtained give reasonable ex-
understanding of the factors which influence nasal form and bring about the successive characteristics of nasal growth."

pectation that this method of study will eventually greatly enlarge our proper

Fig. 1 is a diagram of the method of measurements used by Pitkin. The survey just read was made from the standpoint of the nose alone and is probably more interesting for that reason. It almost establishes conclusively that the deflected septum and malformed arches are contemporary.

Fig. 2 shows an embryonic skull. Note the flat arch, the short vertical diameter of maxillary bone; also the near absence of the maxillary sinuses.

Fig. 5-*A*.

Fig. 5-*A1*.

There have been theories advanced that the arch is forced up in cases of mouth-breathers, causing the high v-shaped vault but it is more reasonable to believe that the sides or outer portions of the maxillary bones grow downward somewhat normally, and the atmospheric pressure being reversed hinders the downward growth of septum, thus shortening the vertical diameter and in most cases causing a deflected septum.

Fig. 3 shows a fairly normally developed adult skull. Here you see the maxillary sinuses well developed, the great amount of vertical growth of the outside portion of the maxillary bone. I have shown these slides merely to demonstrate how easily abnormal breathing can deform the bones.

You will find a very interesting article by Dr. Paul Rogers in THE INTERNATIONAL JOURNAL OF ORTHODONTIA, February, 1924, stressing more particu-

larly the muscles of mastication which are very essential but I will emphasize especially those of the face, nose and neck and I will attempt to show the advantage of muscle training pertaining to them, for we know bone grows as does other tissue, through stimulation.

Not so long ago we were using heavy wires in orthodontic treatment which created considerable irritation and some of us thought the more irritation the greater the efficiency. We passed from this to where we let the pain be the determining sign or danger mark. Now we use a very light platinized wire which gives the proper stimulus and for our determining sign we watch the tissues and keep them at their normal pink as nearly as possible. We are having much more pleasing effects, especially to the patient as there

Fig. 5-*B*.

Fig. 5-*B1*.

is practically no pain and but little retention necessary for we have normal metabolism going on through the entire process of movement. The same is true of the muscle stimulating effect on the bone and tissue. The advantage of early treatment is threefold; the patient is in a developmental state, cells are more numerous, and there is less retarded development of muscles.

The dilator naris, posterior and anterior depressor naris all require exercise and development. For during their lack of use they have atrophied or are retarded in development. You will also note that in all these cases the septal cartilage is very short, causing the end of the nose to turn downward. There is a great amount of exercise necessary in all the muscles of expression, especially the orbicularis oris must be lengthened to hold the pro-

truding teeth in position. The levator labii superioris alaeque nasi, in fact, all the muscles of expression are impaired. The functioning of these muscles together with the development of the maxillary sinuses also raises the tissue below the eyes and does away with the sad and dreary appearance that always accompanies these cases.

Some time ago I made an examination of the inmates of the Kansas State School for the Feeble-minded at Winfield and it was interesting to note that nearly all of the idiot ward had defective arches, sinuses and especially deficient cartilaginous portion of the nose; but on investigation I found that their exercise was nearly "nil," there being no occasion for functioning of the various muscles and organs, especially the alien cartilage as there was no forced breathing. Also the habit of holding the mouth open and letting all muscles relax deterred muscle development.

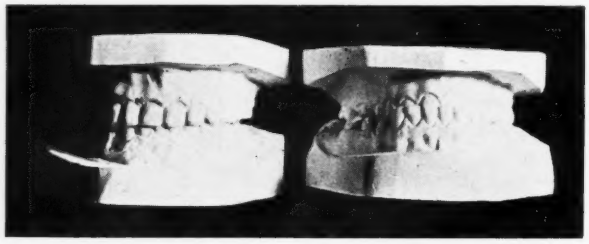

Fig. 5-*C1*. Fig. 5-*C*.

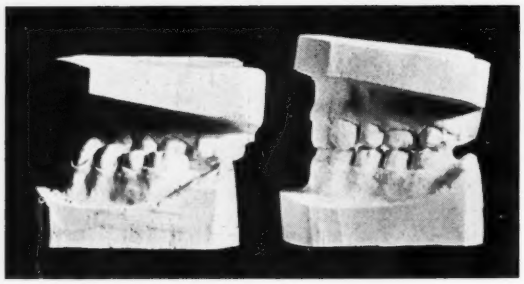

Fig. 5-*D*. Fig. 5-*D1*.

In the moron ward, and among higher imbeciles and those doing out-of-door manual labor, I found a decidedly better condition, especially in the cartilaginous portion of the nose. I also saw an Indian, whose cartilaginous nose was so highly developed that the alien cartilage was more like celluloid; the dilator muscles were extremely well developed.

Fig. 4 is taken from our old friend, "Gray's Anatomy," merely showing various groups of muscles.

In Fig. 5, *A, B, C, D,* is presented a case with a congenital absence of the maxillary second premolars, causing a deficiency in the size of the maxillary arch. The maxillary teeth were brought forward and the molars made to occupy the space of the two missing premolars. Fig. 5-*A* shows front view of the patient at beginning of treatment; Fig. 5-*A1* ten months later; Fig. 5-*B* shows side view of the patient at beginning of treatment; Fig. 5-*B1* ten months later; Fig. 5-*C* shows front view of model of case at beginning of

treatment; Fig. 5-*C1* ten months later; Fig. 5-*D* shows side view of model of case at beginning of treatment; Fig. 5-*D1* ten months later. Note the rapid advent of the "cupid's bow" curve of the upper lip, the restoration of tissue about the eyes, the disappearance of the dimple in front of the ramus and the general improvement of the facial contour. For this type I stress special exercise of the upper orbicularis oris and all muscles of expression, emphasizing the fact not to massage them but that the muscles themselve must do the lifting; also blowing under the upper lip causing a stimulation of all tissues.

Fig. 6-*A*.

Fig. 6-*B*.

Fig. 6-*C*.

It is obvious that this case is not completed but you must concede that there has been rapid restoration of tissue. I attribute this to the fact that the young lady was very conscious of her appearance, of more mature age she cooperated perfectly.

Fig. 6-*A* is a photo taken at six months; note the typical adenoid appearance. I failed to get a photograph when I began treatment but Fig. 6-*B* is the model taken at beginning of treatment. Fig. 6-*C* and *D* are photographs taken two and one-half years later. This case lacked cooperation. The most natural exercise for the muscles of the face and especially the lip is bringing them all into their rational functioning or involuntary action.

For instance it is a conservative estimate that the muscles are used fifteen hundred times a day in mastication and five hundred in speaking. No patient will voluntarily do this two thousand times a day, therefore, we must create a normal functioning if possible, and especially emphasize keeping the mouth closed during mastication. This patient had always insisted that she kept her lips closed in eating. I had occasion to observe her at a banquet one night and she kept her mouth closed by stretching the lower lip while the upper lip remained nearly stationary.

Fig. 7-*A* is a similar type to Fig. 5 with the exceedingly short upper lip. Note the extreme deficiency of the alien cartilage which is completely col-

Fig. 6-*D*.

lapsed; it took the patient some time to find the dilator muscles. She did not know she had a nose as far as breathing was concerned. The cartilaginous portion is extremely small.

Figs. 7-*B* and *C* show the same case two and one-half years later. The lip is not sufficiently developed to retain the teeth in position. In this case I did not get good cooperation, however I got fairly good results. Note the generally undeveloped muscles, due to their lack of functioning; this case will take another year or more. The nose and lip are brought out fairly well but not sufficiently to hold teeth in position.

Fig. 7-*D* shows a model of these teeth at the beginning of treatment. Note the mutilated condition. The mandibular teeth bite into the upper tissue which causes it to bleed freely. It goes without saying that these two

types were mouth-breathers and had gone through the usual routine of having their adenoids and tonsils removed; yet they were still deficient breathers. In this type I recommend exercise of the muscles of expression, dilator naris,

Fig. 7-*A*.

Fig. 7-*B*.

Fig. 7-*C*.

taking many forced breaths to develop the sinuses, the depressor menti, the superior and inferior hyoid group, in fact, there are few of the muscles of the face and neck that are not impaired. Some people talk out of one side

of their mouth, some use only the lower lip in speaking. This is habit and an abnormal condition. The long period of functioning has created a muscular inertia, which may in turn create an inert mentality or vice versa.

In Fig. 8-*A*, we have a very normal upper lip at two years of age. It is extremely well developed. Also there are well developed cartilaginous nose, chin and neck muscles.

Fig. 7-*D*.

Fig. 8-*A*.

Fig. 8-*B*.

Fig. 8-*B* taken at the age of four years shows enlarged nasal passages; good alien cartilage, which should stand out somewhat like those of a horse when it is under exertion. The average mouth-breather sucks in the alien cartilage during inhalation rather than expanding or throwing it out with properly developed muscles.

Fig. 9-*A* presents a posterior occlusion. Note the extreme deficiency of tissue in the depressor menti region, the rolling lower lip, the adipose tissue,

Fig. 9-*A*.

Fig. 9-*B*.

Fig. 9-*C*.

due to lack of functioning of muscles, very hard and cartilaginous in appearance.

Fig. 9-*B* presents the front view, fifteen months later.

Fig. 9-*C* shows the side view. Note the disappearing roll of lip; the tissue is smoothing up and at this period is very soft, due both to muscle functioning and massaging.

Fig. 9-*D* shows the model at the beginning of treatment illustrating the deficiency in the region of mental eminence.

Fig. 9-*E* is study model fifteen months later. It is evident that this case is not completed and while the cooperation was not the best, still we got a great deal of development by muscle exercise. This type will never become public speakers or hold any very important position in life, in fact I was unable to find any of this type among leading men. Alexander Graham Bell, scientist and inventor, who taught the deaf and dumb to speak and who invented the telephone, says, "Now, when we study the production of voice,

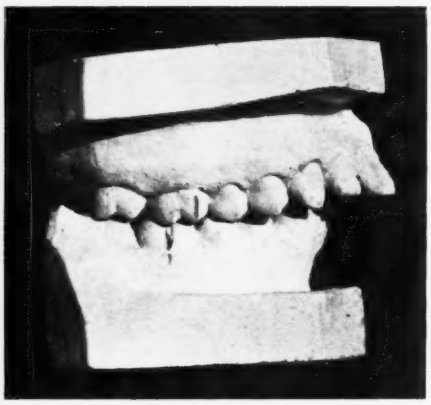

Fig. 9-*D*.

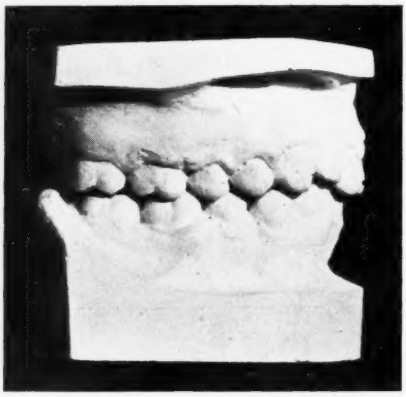

Fig. 9-*E*.

we find that these three characteristics originate principally in three different parts of the vocal apparatus.

"1. The pitch of the voice is determined by the vocal cords.

"2. The loudness by the abdominal or expiratory muscles; and

"3. The quality or timbre by the parts above the vocal cords.

"Air escapes from the lungs through this vibrating glottis in a series of puffs, and the force of emission is chiefly determined by the action of the abdominal or expiratory muscles.

"The upper part of the larynx, together with the pharynx, nares, and mouth, constitutes a passageway or tube of variable size and shape, through which the vibrating current of air is passed. It is here that the voice is moulded, so to speak, on its way to the ear, and the shape of the passageway largely determines the quality or timbre of the voice."

Figs. 10, 11, 12, 13 and 14 will show you the opposite type or some of the types you usually find in men of affairs; note the especially well developed neck, face and nasal muscles.

Fig. 15 will show muscles of the neck. We will first consider those above

the hyoid bone, digastric with its two bellies, the genioglossial, glossopharyngeal, all have to do with the development of the mandible in normal conditions and their lack of functioning is responsible for its lack of development. W. T. Coughlin, referring to an operative case, in an article in the *Journal of the American Medical Association*, states, "What struck me most at operation was the entire absence of anterior bellies of the digastric muscles. The bor-

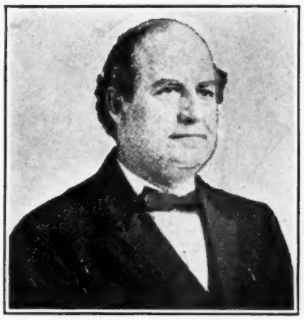

Fig. 10. (After Stanton.)

Fig. 11. (After Stanton.)

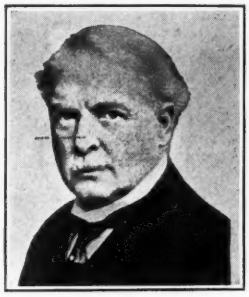

Fig. 12. (After Stanton.)

Fig. 13. (After Stanton.)

Fig. 14. (After Stanton.)

der of the jaw lay very close to the hyoid bone. Not a trace of the anterior belly on either side could be seen. The posterior belly ended in the tendon, which lost itself on the hyoid bone, and some fibers went on and were attached to the mandible." In this type of case all the movable tissues of the neck are posterior to normal, and as I have stated the voice is always impaired. This is due to the hyoid bone and all muscles attached being posterior, carrying the thyrohyoid membrane back and in turn these encroach upon the epi-

glottis which of necessity must affect the voice. A very interesting fact is that this type of case, especially in the male, has a prominent Pomum Adami or that portion of the thyroid cartilage commonly called Adam's apple. This is normal or nearly so, as Fig. 15 will show you the infrahyoid muscles and the hyoid and all its attached muscles are carried posteriorly, and leaves this more exposed.

In summing up the points, I have tried to show you that all associated parts must function normally in order to have harmony of the body: that you cannot remove adenoids or tonsils in case of restricted arches and defective breathers and expect a normal condition; neither can we correct the malformation of the arches and leave the patient with diseased adenoids and tonsils

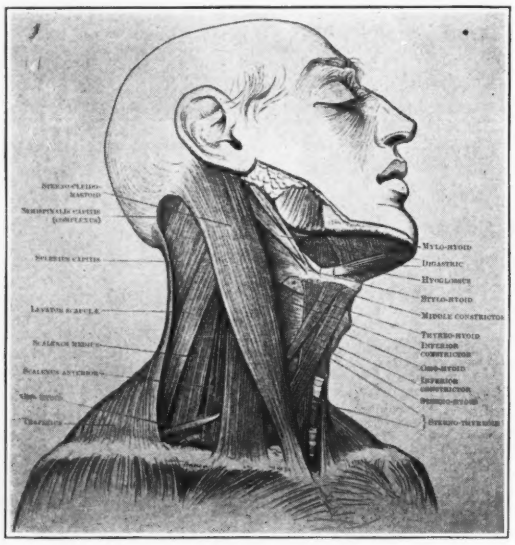

Fig. 15. (After Cunningham.)

and get results; that bone and associated tissues develop by muscle functioning; that all atrophied or undeveloped muscles must be sufficiently exercised to restore normalcy; that the voice and mentality are impaired by malformed arches, especially in the mouth-breathing type of case, which is possibly due to abnormal breathing, malnutrition, possibly affecting the thyroid, pituitary, thymus and other ductless glands, and submitting the patient to embarrassment.

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DISCUSSION

Dr. Curtis W. Williams, Shreveport, La.—I feel very much honored to have been asked to discuss Dr. Robison's paper. I am very pleased with his subject and the way in which it was presented with the elucidation of slides, because it takes up a matter that is vital to the practice of orthodontia. I heartily approve of Dr. Robison's investigations

and findings, for it is only through such channels that we improve our knowledge and promote new ideas for the progress of our science. His paper shows both talent and much study and as far as my discussion is concerned I will only try and emphasize a few of his points.

According to Dewey's *Orthodontia* we have six forces of occlusion, namely: Normal Cell Metabolism, Muscular Pressure, Force of the Inclined Planes, Normal Approximal Contact, Harmony in Size of the Arches and Atmospheric Pressure. One force being dependent upon the other it stands to reason that when one force is lost we will have inharmony in all the other forces. I believe that adenoid cases, wherein the child becomes a mouth-breather cause the greatest disturbance of facial muscles.

Dr. Kelsey, of Baltimore, said: "In regard to the muscular mechanism which helps to produce the distal occlusion, I have evidence of support, that cases belonging to this class are practically always due to adenoids and I believe this to be true because of their anatomic position in the respiratory tract in the following manner: as they increase in size the space above and back of the soft palate is diminished until nasal breathing is no longer possible and mouth-breathing is fully established, which means, of course, that instead of the teeth being in occlusion as is natural during the periods of repose, they are separated, the mouth being open to breathe, and the influence of the normal relation of the inclined planes of the teeth upon each other is lost. The muscles of expression and mastication are also functionally perverted, and the influence of the tongue (the normal counter-balance to the external muscular pressure) is reduced to the minimum, as it no longer fills the oral cavity in which it is ordinarily sustained when the lips are in normal contact by exclusion of air, a slight partial vacuum is formed between it and the posterior portion of the palate. Not only is the tongue not sustained in the roof of the mouth, but it is actually depressed and maintained in that position to relieve it from contact with the soft palate. To accommodate this depressed position of the tongue and aid in maintaining a free opening for air, the contraction of the mylohyoid and geniohyoid muscles above, and the sternohyoid and omohyoid muscles below takes place, which opens the throat and straightens out the angle between the body of the jaw and neck, as may readily be observed in anyone, and becomes a diagnostic symptom in this class of deformities."

The contraction of the muscles forming the floor of the mouth (the mylohyoid and geniohyoid) also reacts upon the jaw in a tendency to draw it distally, and in the young subject its influence is soon marked by distal occlusion of the teeth when the jaws are closed, as occurs in these cases only in mastication and in swallowing. I do not mean to say that the mandibular jaw is actually drawn very much distally but it is to an appreciable extent; and this together with the retarded development, is sufficient to permit the inclined planes of the erupting molars to engage distal to normal, after which every closure of the jaws in mastication tends to slide them into complete distal occlusion. Then it is rare indeed that the jaws regain their normal relations without aid, even though the adenoids have been removed and normal breathing resumed. Imagine these conditions obtaining for a considerable period of time at any stage in the child's development, and it is easy to see how he will grow into the deformity.

After a person has reached a mature age, and his teeth are in a posterior occlusion the muscles and all the soft tissues of the face, which have for so long accommodated themselves to the abnormal position on the mandible, will, for a long period, tend to draw it back into the same old position after treatment has been given. In such cases muscle training is a great help in retention. The accommodation of the muscles and soft tissues in children comes about very much more quickly because they are still in a growing state and the muscles may be induced to grow normally instead of abnormally, while in the adult it is a case of correcting an abnormal growth and producing often a secondary alveolus, yet in so far as function can be established and maintained, so far will treatment be successful in adults, and this is often considerable.

ON THE APPLICATION OF MATHEMATICS TO ORTHODONTICS*

By Dr. F. L. Stanton, New York, N. Y.

THE lantern projection included an orthographic mapping instrument, orthographic maps of normal occlusion and of malocclusion, the occlusograph, an instrument for determining normal occlusion, orthographic maps of occlusion as determined by use of the occlusograph, a method of relating the map of occlusion to show the least tooth movement, etc. In the course of his remarks Dr. Stanton said orthodontists needed a terminology that would permit them to describe the form of normal and abnormal dentures, and it was necessary to refer their conception of form to lines of magnitude and direction, for the form of an object was defined when its magnitude was known in various directions. Before proceeding to consider specific form in dentures it was worth while to consider the phenomena of spatial magnitude or the extension of a body in the several dimensions of space. Growth also involved the same conceptions of magnitude and direction, except that the magnitude and direction were supposed to alter in time. Space was filled with lines, points and planes, and those were elements out of which to construct figures for a proper conception of the form and dimension of a denture. In order to measure anything in space it was necessary to assume three planes and adopt the viewpoint of the architect or engineer in order to produce properly a dental apparatus. The architect represented a house and projected in straight parallel lines the floor plane of the house and the front elevation and the rear eleavtion. The adoption of some such terminology in orthodontics would mean that, no matter in what language information was published, it would be understood alike by mathematicians and dentists. At the Royal College of Surgeons recently his method was shown to Sir Arthur Keith who grasped it in a few moments and demonstrated it to some of the dentists of London. When the terminology of the textbooks on orthodontics was used dentists could not understand each other even in their own language. The three planes should be defined and related to the head, and there should be a standard from which any person in any part of the world in speaking of a dental apparatus could make it clear without any difficulty. For that purpose the direction of the planes must be described and a suitable instrument used.

Dr. Stanton then exhibited and explained his method and the various instruments used in connection with it.

DISCUSSION

The President said what Dr. Stanton had shown had been very interesting and somewhat surprising. The demonstration showed many things of interest and importance for orthodontists and it would be impossible for him to discuss the question until he had time to study the whole thing.

*Proceedings of the European Orthodontological Society, 1922.

Dr. Schroeder said that at one time Dr. Stanton had not been able quite to convince him of the value of his work, but today he was absolutely convinced and he saw no point where Dr. Stanton's explanation failed. It was a matter of pure mathematics all the way through and he thought it was the greatest thing that had been brought forward in orthodontics for many years.

Dr. J. T. Quintero also thought that the method shown by Dr. Stanton was one of the most important things in orthodontics. Arch predetermination was quite an old thing. When Hawley's method came out it was quite a novelty and seemed to be a great step towards progress. It was the transposition into orthodontics of Bonwill's method. In 1909 Dr. Pont, of Lyons, brought out his dental index which was merely a simplification of Dr. Hawley's method, and by measurement of the central and lateral he determined (or claimed to determine) the normal width between the maxillary first molar and the maxillary first premolar. There was also another method by Siffre in which he took the same measurements, and according to him the teeth lay on a semicircle and the diameter of the semicircle passed through the anterior cusp of the molar, and by that method he got similar measurements. It was an easy matter in a drawing to make it all come out correctly, but if tried on teeth and models or on patients it did not come out correctly at all. Those methods made all the arches alike and that was a great inconvenience; they did not take into account at all the personal variation of the patients. To determine what the normal arch should be it was necessary to determine the abnormalities, and those could only be defined in their relation to certain fixed anatomical points which belonged to one or more of the planes of direction in space. For instance, the three planes of space must be first of all applied to the human body and there must be a vertical anteroposterior plane, a vertical lateral and a horizontal plane, which had been already determined by anatomists and anthropologists. They were called the sagittal, frontal and coronal planes. Those were mere names which could not be applied to dental and orthodontic purposes without anatomical landmarks to make the planes real. Thus, for instance, the sagittal plane could be defined by the median raphe of the palate, and that had been done. The line was always exactly anteroposterior and exactly in the middle plane of the head. With Grünberg's symmetroscope which came out twelve years ago it was possible to determine this line, but it was difficult to make the symmetroscope and model agree exactly. For the horizontal plane quite a number of planes had been proposed. He showed a sketch of two planes more or less horizontal. One was known as the Camper plane. The other was the Frankfort plane, which was shown in 1880 at the Frankfort International Congress, and which seemed a much better plane to use, because the Camper plane was not absolutely defined in the sense that the nasal point could be altered during orthodontic treatment. The Frankfort plane was always immovable and remained the same during treatment, whereas in the other case it might change. In using the occlusal plane as a fixed horizontal plane, as did Dr. Stanton in his calculations, he thought it provided a basis which was *movable* and did not allow a comparison to be made of conditions at one time and conditions at another. He thought that the method proposed by Dr. Stanton had a great many good points but that something more had to be done with it because it was not quite perfect yet. He was afraid it lacked a fixed basis from which to take measurements. For instance, Dr. Stanton said that he took the centroids of the teeth and measured them, but he did not understand that he exactly determined what the centroids were and where they were situated. Since the whole thing rested upon the centroids it did not seem absolutely definite to him. It was, however, really a wonderful new invention and he thought everybody ought to get to work upon it because something was sure to come out of it, if properly applied and developed.

Dr. W. S. Davenport said that many years ago when with his brother, they spent years in attempting to discover something in connection with the normal occlusion of teeth, but were never able to find anything that would approach to what was really normal. Then working on the principles of Bonwill, studying out and assisting his brother in the construction of his split models in connection with his work on curves, and in afterwards attempting to apply the principles that were more or less adopted at that time for practical purposes in constructing artificial dentures, he came to the same conclusion in regard to

the best principles. No one had been able to use a fixed principle in the construction of artificial dentures without adjustment in the mouth. He was with Dr. Quintero in not seeing the theory on which the basic lines had been established. It was well known that in mathematics, given certain lines, anything could be done. As a pastime he had taken up painting and had found it was a very easy matter to paint a cathedral because there were lines on which to work and which could be followed, but when painting a tree or some natural product he was dealing with something that gave very little basis to work from because a tree varied and oftentimes was deformed. The same difficulty was met with in connection with teeth because each particular tooth was formed differently and had its own individuality. There was no perfect form of tooth yet any more than there was a perfect form of maple tree and maple leaf. What interested him very much was that Dr. Stanton had broken down the erroneous ideas of Bonwill and had discovered a point from which to work, namely the centroid. He (the speaker) had not gone into the geometry of the subject, but had painted sufficient architectural work to know that there were difficulties in geting the lines that were required. An architect had to establish his lines correctly and could not deviate at all from the fundamentals. Dr. Stanton's work was far in advance of anything he had heard of previously, and he should do his best in the future to discover the reason for the establishment of the basic line, because if he could do that he could go on and establish the rest. The specimen shown by Dr. Quintero was faulty because the doctor had to act on guesswork; there were no principles at all.

Dr. Dreyfus said he had not understood how Dr. Stanton had found the centre of the mouth to give a line, and should be glad to have that information.

Dr. A. C. Lockett said he could not really discuss the paper critically; it could be hardly expected that a man could intelligently criticize a communication such as Dr. Stanton had given that morning after only hearing the exposition once. There was no doubt that Dr. Stanton had put in an enormous amount of work on the subject. His own feeling was that Dr. Stanton would find it difficult to evolve definite bases on which to proceed to determine exactly what the orthodontist proposed to do before starting to do it. If he had any quarrel—and he did not know that he had—with the teachers of the past in connection with such work it had been that they never left in his mind that there was any doubt in their minds, but that they had said the very last thing and that all he had to do was to go to work and do the same. He did not mean that they intended to convey that, but that was the impression left. Dr. Stanton and he took a course together in America. He himself was a raw young man from college and it would have been entirely out of place, having no practical experience, to offer any criticism, or show that he was not prepared to accept everything he was taught as an established fact. Furthermore he did not go to quarrel with anyone, but simply went to get all the information possible, and he believed he obtained everything that a man could obtain. Owing to the fact that most of the men taking that course were men who had been in general practice for quite a number of years it was possible that, if they could not see any pitfalls in the teachings, he might very well be wrong. It seemed to him that Dr. Stanton's work was based on some more definite mechanical method than anything in the past in view of the fact that most of his conclusions were arrived at by actual measurement with accurate instruments. It looked as if it meant more work for the orthodontist, but if it was going to reduce the amount of work and time all orthodontists had to devote to their cases, by preventing them taking up unnecessary movements, it would commend itself highly to most and he hoped to try and follow it out. The society was greatly indebted to Dr. Stanton for coming so far, for bringing the matter before it and for having spent so much of his valuable time in research work.

Dr. A. L. Hipwell said he was with Dr. Fisher in New York, and said to him: "I am reading articles by Stanton, and his arguments are very effective and I shall have to see him to make them convincing." He thought that Dr. Stanton was five years ahead of other men in America. Dr. Dewey and Dr. Stanton thought the subject out and published it in the orthodontic journals, and today Dr. Dewey was teaching it in the schools. That went far to convince him. Another thing that helped to convince him was seeing a

few of Dr. Stanton's cases in his own office, which led to his appreciation of his accurate and scientific way of treating his patients. If it took seven years in New York to convince the majority of the men, in Europe it frequently took decades, and, therefore, on this side of the water orthodontists had to get busy and beat New York by following Stanton at once.

Dr. Stanton said very nice things had been said about him, but the arguments which he liked best, as it gave him a little resistance, were those put fowrard by Dr. Davenport and Dr. Quintero. They could not have picked on anything he should have liked to answer better and it might almost be thought that he had fixed it up with them in order to get an opportunity to speak. Dr. Quintero said that he did not like the idea of dealing with the occlusal plane as a fixed point. Men in Europe should know more about relativity than men in America because they were nearer to Prof. Einstein. Everything in movement and in measurement was a thing of relativity. He might say that he was standing still but, as a matter of fact, he was partaking of the motions of the earth on its axis and in its journey round the sun and with the solar system through space; yet everyone understood him when he said "I am still." What Dr. Quintero had spoken about, the Frankfort plane and so on, were things to be avoided. The denture had its deforming forces at work in the position where it belonged, in other words the deforming forces had acted on the denture in the place where the denture rightly was and therefore if there was one point that was nearer its correct place than any other it was the denture. When he carefully analyzed the normal dentures he showed that if a plane was selected it produced an average distance of all the centroids of the teeth. In other words, it was necessary to have a bench mark, and if a centroid was selected it did not matter where it was selected; it was only a convenient point in the projections. Men in Paris could make a map and select a point and follow that point in all treatment, and he in New York could do the same and the results would be identical, the centroid would come out exactly the same. In analyzing normal dentures they followed certain lines if a horizontal plane was selected. Dr. Lockett's secretary at the very first time found the centre of the denture and arrived at exactly the same point that a man did in New York. Theoretically the centroid would have to remain fixed and in treating cases the relative marks had to be placed on the maps. One could relate the centroid to the occlusion map or the progress map or the original map and it did not matter—the registration marks always came out the same. It was a positive and definite thing. It was very hard for a dental man to get away from the idea of measuring from a fixed point. A mathematical formula was now available which could be applied with the greatest precision. With regard to Dr. Quintero's remarks on the symmetroscope, that axis was related to some anatomical mark and depended on the personal equation of the person putting it on and then it had to be passed over on to the other model. Also where was the third dimension in it? Grünberg's symmetroscope and the Hawley arch were the foundations on which he built, and also the work of Dr. Davenport's brother. Dr. Davenport's paper read in 1887 was the best ever written on the relation of the curves of the arch. With regard to Dr. Davenport's statement that the tree was not a thing of mathematics, if Dr. Davenport would consider how the leaves were put on he would find that it was a true logarithm curve in which every leaf was placed with the greatest mathematical precision. The Chambered Nautilus as it moved built itself a true logarithm curve. The Temples of Greece and the Pyramids were all laid off in parallelograms, and those parallelograms were based on the geometry of living things. Everything that Dr. Davenport thought good in art could be analyzed and could be shown to be built on the methods of growing things. The Greeks and the Egyptians knew far more of the mathematics of nature than the artists of today. Thompson, of Dundee, had written a most wonderful work on the mathematical growth of living things, and he would suggest to the Society that he should be asked to lecture before it as he could deal with the subject thoroughly with a deep knowledge of biology and anthropology. With regard to the determination of the centroid, the theory was that the centroid of the tooth was the centre of the closed line at the gum, and that there was a plane in which all those points had an average distance above and below. That established the plane, which was marked down, and then to get the centroid of the group a measurement was taken from one edge of the table and a line obtained. Then a measure-

ment was taken from the other side of the table and the average distance where the lines crossed was the centroid of the curve. If a wire was taken and soldered from the centroid of each tooth to the centroid of the denture and the whole thing put upon a pin the denture would balance in space. It did not matter what happened to the growth of the head, that centroid was fixed.

PROFILOGRAPH—A DEVICE FOR RECORDING THE PROFILE OF THE FACE, POINTS ON THE FACE AND CRANIUM, AND ANY OF THE TEETH IN THEIR ACTUAL RELATIONSHIP ONE TO THE OTHER

By A. Wolfson, D.D.S., East Orange, N. J.

THERE exists in orthodontia today a great need for means of recording the positions of the teeth as related to the face and cranium. This becomes apparent when one reviews modern orthodontic literature. Dewey defines normal occlusion as "the relation of the inclined planes of the teeth as intended by Nature." Apparently this is a very simple and indisputable statement, and yet, what a field for differences of opinion is opened up by such a definition! The first thought that arises to the investigating mind is—Just what did Nature intend these relations to be? The answers to this question represent many highly divergent lines of reasoning with their accompanying differences in method of treatment. I can best express the thought I have in mind by quoting from Dewey's "Practical Orthodontia," page 440. "Owing to the extreme facial deformity present in distoclusion with protruding maxillary anterior teeth, or Class II, Division I, cases, the literature on orthodontia is full of these cases and of the different plans of treatment. In fact, the advancement of orthodontia may be traced through the advancement in the technic for the treatment of distoclusion cases, or Class II, Division I, cases. Therefore, it will be appropriate to state briefly the different plans of treatment as practiced in the past and at the present time.

"One of the first plans of which we have any record is one in which the case was treated by the extraction of some teeth. A maxillary premolar on each side was extracted; first, to establish harmony in the size of the arches, and second, to reduce the protrusion of the maxillary anterior teeth. This plan of treatment made the maxillary arch conform to the underdeveloped mandibular arch, improved the occlusion slightly and changed the facial profile. Normal occlusion and normal facial outlines were not recognized by this plan.

"Owing to the unsatisfactory facial results and the lack of normal occlusion, the next method of treatment to attract attention was the one introduced by Kingsley and known as 'Jumping the bite.' This plan has for its object: first, the establishment of the normal relation of the arches by reducing the protrusion of the superior maxillary anterior teeth; second, the forward move-

ment of the mandible, which improves the facial outlines; and third, the establishing of normal occlusion of the teeth.

"It will be seen that the results that were hoped for in this plan of treatment were much more attractive than those that were obtained by the other method of procedure. The treatment, in brief, was to expand both the maxillary and the mandibular arches and reduce the protrusion of the mandibular anterior teeth until both arches were of the same size and shape. Then the mandible was moved forward by muscular action until the teeth were in their proper mesiodistal relation. The forward movement of the mandible remedied

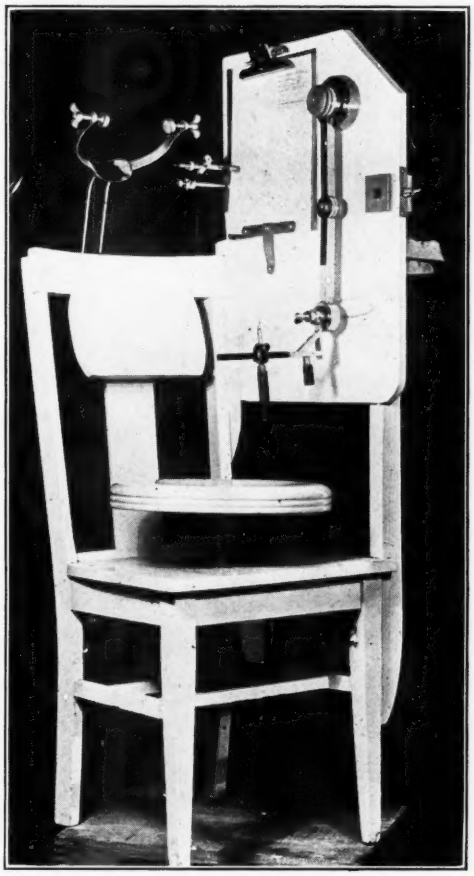

Fig. 1.—Shows chair of the profilograph attached with the vertical table. The seat of the chair can be screwed up or down to accommodate the tall or short person.

the deformity that resulted from the underdeveloped chin. The facial outlines and the occlusion of the teeth were much improved immediately following the completion of the treatment. However, the trouble was that great difficulty was encountered in getting the mandible to stay forward after it had been moved by muscular action. Various forms of retaining appliances were devised and the hope for permanent results was based on the belief that the temporomandibular articulation would change, so as to keep the mandible in its new position and also that the body of the mandible would change. Owing to the great tendency of the ligaments to pull the mandible back to its former position, the author has grave doubts as to the number of cases

treated by this plan that could be said to be entirely successful. The two plans above mentioned were not wholly satisfactory and, therefore, orthodontists were constantly seeking something that would promise better results.

"With the use of intermaxillary anchorage, as used by Baker and used on a distoclusion, or Class II, Division I case, a new plan of treatment was given to orthodontia. With the use of intermaxillary anchorage, it became possible to move the maxillary teeth backward and the mandibular teeth forward. The forward movement of the mandibular teeth was the great feature of intermaxillary anchorage. Up to that time there was no means of bringing about this condition, for the plan known as 'Jumping the bite' moved the teeth only as the mandible was moved by muscular action. After Baker described the treatment of his case, Angle began the use of intermaxillary anchorage in distoclusion and mesioclusion cases. The following was accomplished:

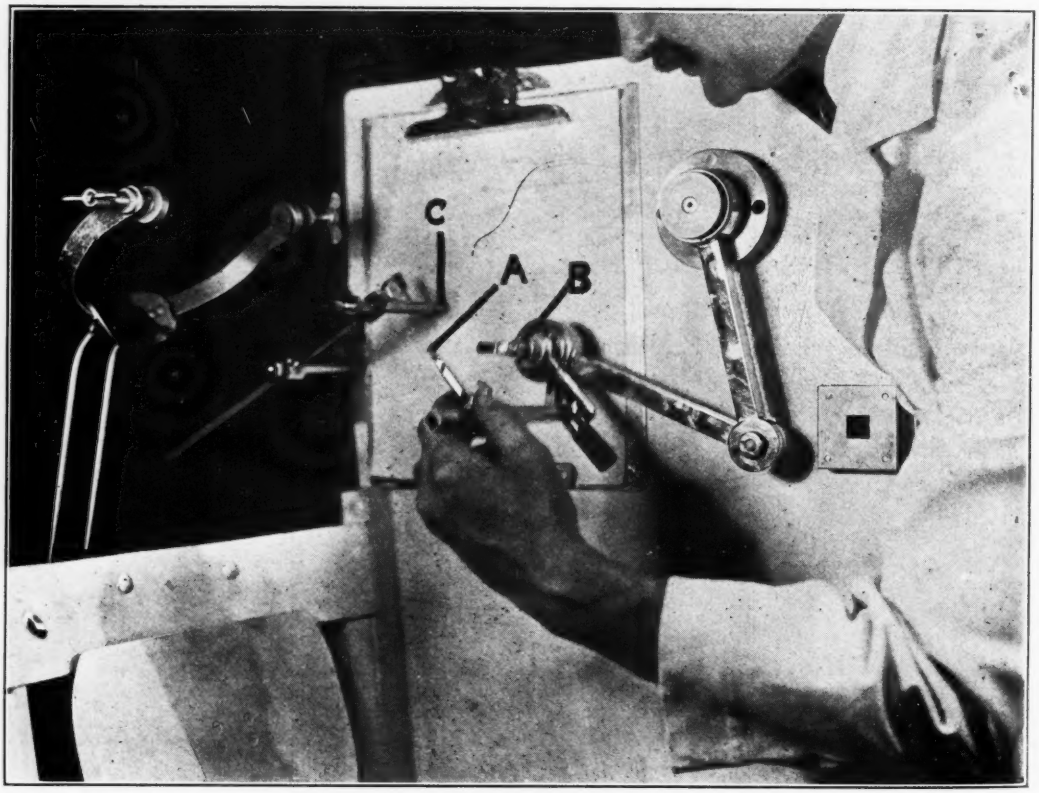

Fig. 2.—Shows enlarged view of the headrest and the instrument. The instrument has a pointer shown at *A*, which is for the purpose of following the facial outline or for selecting certain anatomical points of the face. The arm connects this pointer *A* with the pencil *B* which makes a tracing upon the map held in by clamps on the vertical table shown in both Figs. 1 and 2. *C* is an adjusted pointer used to mark the auditory meatus or tragus.

"1. Establishment of the normal mesiodistal relation of the inclined planes of the teeth.

"2. Widening the maxillary arch and reducing the protrusion of the maxillary anterior teeth.

"3. Moving the maxillary teeth posteriorly and the mandibular teeth anteriorly, bringing about the normal relation as described in paragraph one.

"4. Improvement of the facial outlines of the individual.

"5. Production of normal muscular action by making it possible for the individual to close the lips over the teeth.

"6. Making normal breathing possible because the patient could close the lips.

"More satisfactory results could be obtained with this plan of treatment than from any of the others mentioned. The great improvement was the result of moving the mandibular teeth forward. However, normal occlusion

Fig. 3.—Shows the patient, whose facial profile is being traced, in the chair.

was not always established by obtaining the proper relation of the inclined planes, for in moving the maxillary teeth posteriorly and the mandibular teeth anteriorly, a tipping of the teeth was produced, which was not desired. After the treatment of cases according to this plan, it often occurred that the chin and mandible would be undersized. For this reason it was believed that better results could be obtained if the plan of treatment was changed slightly. The following plan was then adopted, the object of which was to establish normal occlusion of the teeth: first, by widening the maxillary arch and retracting the protruding maxillary anterior teeth; second, by moving

the mandibular teeth forward the entire distance (do not move the maxillary molars backward); third, by making such anchorage and attachments as would prevent the mandibular teeth from tipping, and bring them forward in an upright position. As a result of this plan, the better facial outlines were obtained, the mandible was developed to its normal size, the muscular action became normal and the chin was developed.

"It has been shown in the majority of these distoclusion (Class II, Division I) cases that the maxillary molars are not too far forward. Such being the case, a plan that would approach the ideal result must be one that will not move these teeth backward. Therefore, our efforts should be directed

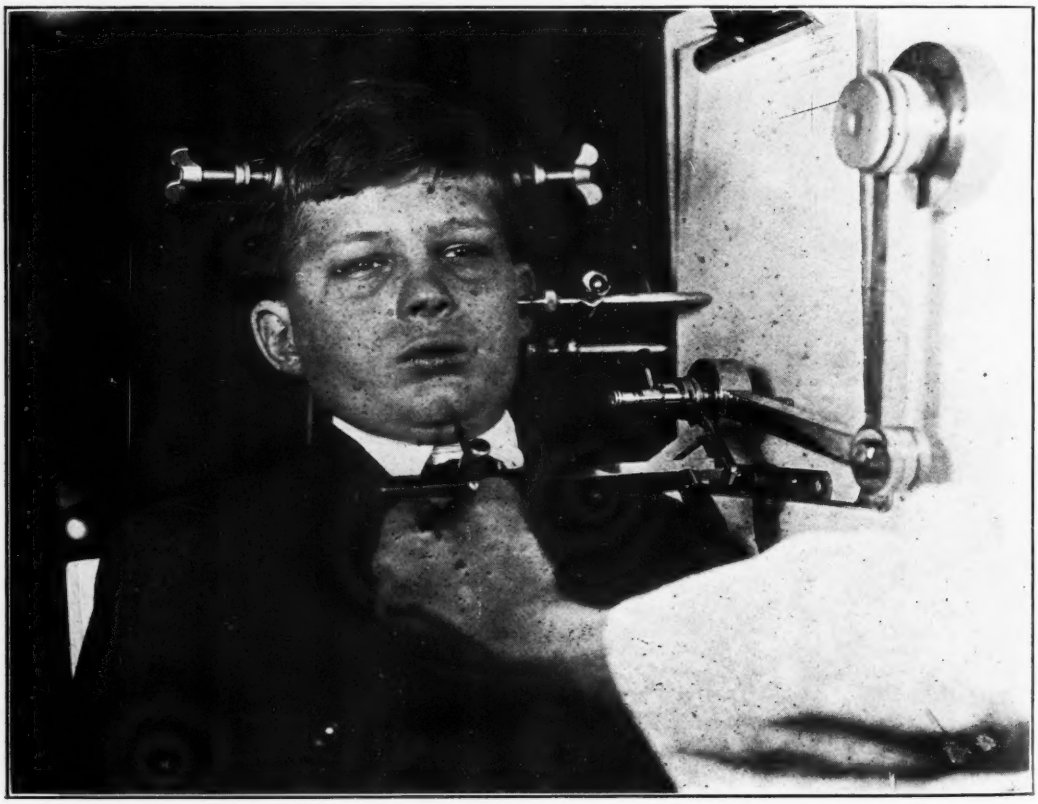

Fig. 4.—Shows a front view of the patient with the pointer *C* placed in relation to the ear. A better view of the arm and map can be seen.

toward moving the mandibular teeth forward and developing the mandible.

"By examining a large number of these cases, by studying the facial outlines and the anatomy of the temporomandibular articulation, the author is convinced that the great deformity that we encounter in these cases in the mandibular region is the result of the underdevelopment of the mandible and is not the result of the posterior location of the condyle. These patients suffer from micromandibular development and not postversion of the mandible. Therefore, our treatment should be of such a nature as will produce a development of the mandible that can be brought about by the last-named plan."

From the foregoing statement a general practitioner of dentistry would be apt to conclude that the orthodontist has evolved through the various

stages enumerated and now all orthodontists treat Class II cases alike. Such, however, is not the case. An investigation of the methods of treatment in vogue today for Class II cases reveals the following outstanding methods:

1. Expansion of arches and a bringing forward of the mandible the entire distance.

2. Expansion of the arches and the so-called "50-50" movement.

3. Expansion of the arches and the pitting of the mandible against the maxillary posterior teeth to bring all of the maxillary teeth back.

4. Expansion of the arch and then gentle intermaxillary elastic force to bring the entire mandibular arch forward into apparent normal occlusion, thereby developing the mandible to normal size.

5. Extraction of two maxillary premolars and retraction of the maxillary anterior teeth.

6. Expansion of the arches, bringing mandibular anteriors forward, and the insertion of two artificial extra premolars in the mandibular arch.

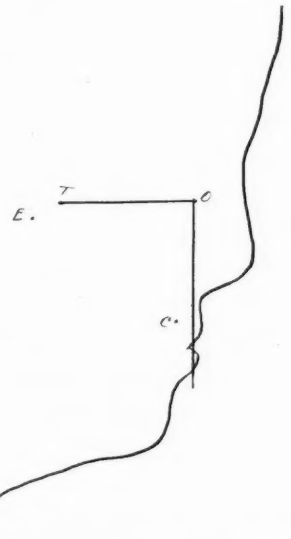

Fig. 5.—A dento-facio cranial map which shows the relation of orbital point *O*, the maxillary canine *C*, and the tragus *T* to one another, also to the face. The line *TO* represents Frankfort Plane. The right from *O* at right angles to *TO* represents Simon's Orbital Plane.

Each of these methods is sponsored by men of unquestionable ability and reputation in orthodontia today, and I might add the opinion of an engineer, who has had considerable experience in the development of mechanical devices for orthodontia and who is thoroughly conversant with the mechanical aspects of tooth movement. It is this man's opinion that, regardless of the intentions of the operator, whether they be to bring the mandibular teeth forward all the way, or to bring the maxillary teeth back all the way, or to produce a "50-50" movement, that the ultimate position of the two jaws within the skull would be practically identical. This view implies necessarily two things: First, that the end-results obtained today by the various men mentioned are practically the same when we consider the resultant profile of the patient. Second, that there is a limitation to what our mechanical devices for tooth movement will accomplish and that the translating of an entire denture

from one position to another is not under our entire control. Another factor which causes confusion is the contention made that many of the cases diagnosed as Class II are not really cases of posterior occlusion but rather of anterior version of all the maxillary teeth. I do not here have reference to those cases in which, due to extractions in the maxillary arch, several of the posterior teeth have drifted forward, but rather to those cases in which all of the teeth are present and the chin fairly well developed.

Summarizing, then, the present status of treatment and wide divergences both in method and diagnosis, one cannot help but feel that a solution of this problem cannot lie in the spectacular results produced by one operator as compared to those produced by the others; but rather that it will be necessary for the orthodontic profession to arrive at a common ground of diagnosis and classification. In this connection the following definition from Dewey seems to throw the best guiding light: "Classification should be based upon the relationship which the mandibular teeth bear to the maxillary teeth as related to the face and cranium." If we could but establish satisfactorily some relationship which exists in well developed normal skulls between the dental arches and the rest of the face and cranium, we would have a definite ideal as far as tooth mass placement goes. Diagnosis could then be based upon the departure of the malposed arches from that ideal.

That such a need exists in our diagnosis is evidenced by such recent attempts as have been made by Simon, Schwartz, and Dryfuss. These men, more particularly Simon, who has recently presented his findings in this country, are aiming at finding a constant relation between certain points on the face and cranium and positions of the teeth. Simon's contribution consists of the conclusions which he drew from an investigation of many skulls to the effect that the orbital plane of the skull passes through the canine teeth. Whether we are willing to accept this or not does not detract from the basic thought that Simon has taken a step forward in diagnosis. We need but repeat his investigations and then either accept his findings or discover new ones.

Appreciating the need for classification being based, not upon the relationship of the teeth of one arch to the teeth of the opposing as illustrated by two plaster orthodontic casts, but rather upon the relationship which exists between the teeth of both arches and the rest of the head, I have invented an instrument which I term a profilograph. This is a device which will record the positions of the teeth, the profile, and any facial or cranial landmarks which we may adopt, all upon one map of natural size and with correct engineering accuracy. Such a map is made as the beginning of the treatment. When the case has been completed, another such map is made and the two maps are superimposed so as to place several of the most unchangeable areas directly over each other. Such a plan will definitely tell the direction and amount of tooth movement of each of the teeth as related to the remaining teeth, and also as related to the rest of the face and cranium.

Another distinct use for my device is the measurement of many skulls having normal occlusion, in an effort to establish some ideal dentocraniofacial relationship which we might use as a basis for diagnosis similar to Angle's

"Key of Occlusion." Such an investigation may bring out one of many truths. It may tell us that for each race or for other anthropologic groups, there is a constant relationship between positions of teeth and profile; or it may establish a definite range of such relationships, or it may establish that there can never be a fixed relationship. Any one of such findings will prove a definite contribution to our science.

Another use for my device lies in the possibility of graphically illustrating growth of the head, anteroposteriorly. No one today can definitely explain the manner of growth of the profile during childhood and youth. Can any one say, for instance, that if we use the ear-line as a basic starting line, that the forehead grows forward at the same rate as the tip of the nose or the tip of the chin? By means of the profilograph it will be possible to take a group of healthy, well-developed children of various ages, make maps of their teeth, craniums, and faces at successive intervals of three or six months, and then relate these maps so as to graphically determine the method of forward growth. Aside from its intrinsic value, this last proposed investigation would bear a definite relation to the possibility of the superimposition of maps as already cited above for the recording of treatments for malocclusion, because it would show us the error that would creep in due to development of the entire skull independent of the development of the jaws as stimulated by orthodontic treatment.

In conclusion, I want to briefly review the arguments presented.

1. There exists today a wide divergence in the method of treatment of distoclusion (Class II) cases and also in the treatment of other classes.

2. These divergences of method of treatment are due to a lack of a common ground for diagnosis.

3. A common ground of diagnosis is impossible with the present orthodox Angle classification.

4. A need of classification exists which will be based upon the relationship that the teeth of one arch bear to the teeth of the opposing arch as related to the face and cranium.

5. Investigations should be conducted with a view of establishing any laws of relationships in position between teeth and rest of the head that may be discovered, or limits of range for such relationships, if no specific relationship can be detected.

6. Craniofaciodental chart records should be kept of all cases of malocclusion under treatment, in order that actual movements may be better understood, as well as that the efficiency of the various orthodontic appliances may be determined.

7. My profilograph is a device which will enable the orthodontist to undertake such investigations as well as keep such records.

NOTE: Since the construction and testing of my original device, pictures of which are shown in this article, I have employed Mr. Gilbert D. Fish to redesign this instrument with a view of making it more perfect mechanically and eliminating whatever mechanical defects that might have crept in unavoidably in an original model. The drawings for the new instrument are complete and in the hands of an expert instrument maker. Just as soon as this new device is finished I shall be pleased to make a further report.

PRESIDENT'S ADDRESS READ BEFORE THE SOUTHWESTERN SOCIETY OF ORTHODONTISTS MEETING AT TULSA, OKLAHOMA, APRIL 8 TO 11, 1925

By T. Wallace Sorrels, D.D.S., Oklahoma City, Okla.

ACCORDING to the usual custom, as president of this Southwestern Society of Orthodontists, it becomes my honor and privilege to address you at this, its fifth annual meeting.

I wish to take this opportunity of expressing my appreciation for being honored with the presidency. The expression of your confidence and friendship, coming as it does from such a distinguished scientific body, places the recipient in a position over which he may justly feel proud. By virtue of his position, he has a greater opportunity to render professional and public service which in turn carries increased responsibilities. It has been my constant endeavor to be ever mindful of these duties and obligations, and thereby demonstrate my gratitude by my actions in directing the activities of the society.

To our guests and visitors, I extend a most hearty welcome and sincerely hope they will find this meeting not only enjoyable, but highly interesting and instructive.

We have a purely democratic organization, fired with the ambition and desire of service. Personal preferences and prejudices are cast aside that greater and better things may be accomplished. As it has been in the past and is now at this meeting, so shall it be in the future; the thought of service in its broadest sense should be carried uppermost in our minds. Our society is a training school where we gather together to better equip ourselves for service to our patients, our professional brethren and the public. It is here we should consider our future business plans and policies with the idea that our deliberations will lead us away from former fallacies of practice to a place of broader and more useful service.

If we are to uphold this lofty ideal and principle of democratic service, it is necessary that we recognize certain other fundamental factors which are essential to the proper functioning of an organization. They are three in number and are divided for convenience of discussion into spirit, unity of action and objectives.

We take great pride in saying our society has a wonderful spirit, justly feeling it is a valuable attribute to the organization. Did you ever stop to analyze this thing we call "spirit"? It is our disposition and attitude of mind individually and collectively expressed by words and actions. Here we are confronted with the power of the mind in many forms. By giving them individual names it is often found quite impossible to draw a line and definitely state where one power begins and the other ends; these powers are

interwoven and very closely related. For instance, it is difficult to distinguish between desire, will, and feeling. In these, we have an instinctive capacity for constructive accomplishments if developed by proper education and experience. It is these forces that put us into action, as we must first have the desire to serve, the will power to carry on against many powerful obstacles, and the feeling to sense right and wrong, in application of the "golden rule." For example, you need only think of the "Spirit of 1776" as one of the most outstanding illustrations in United States history, to appreciate the power and influence of a people imbued with the proper spirit to carry on.

Under "unity of action," we must naturally have fellowship, harmony, cooperation, teamwork, and good sportsmanship with a sense of humor. It is only united effort that has made these meetings possible. We are all working for the same ideals and principles in orthodontia and it would seem nothing less than folly to let any trifling differences of opinion destroy our fellowship. By united effort and by holding steadfast to these ideals and principles, we can accomplish wonders toward putting orthodontia upon a higher plane, not only in the southwest, but nationally. We need only to review our growth and development of the past five years of our existence as an organized body, to appreciate the value of united action. To make the point even more clear and easily remembered, I might mention another example. There is a cantilever bridge spanning the Mississippi at Memphis that is conceded by the greatest bridge engineers in the United States as being capable of withstanding all the stress such a bridge would have to endure in handling transcontinental transportation. However, if a regiment of soldiers were marched across this bridge, it would be necessary for them to break step in crossing for fear of damaging it.

Every worthy organization must have good and substantial reasons for its existence. These reasons must naturally be our objectives. We have as our principal object the advancement of orthodontia, which implies much that is unquestionably good and noble. We should never lose sight of this object in all our transactions. It calls for good fellowship, intellectual advancement and ethics of the highest standard.

Orthodontia has made wonderful progress and growth since the American Society of Orthodontia was organized in 1901. At this time there were less than a dozen orthodontists in the country. Now there are several hundred practicing this specialty. Even withstanding this growth in number, we are only treating a mere fraction of those needing orthodontic service. Malocclusion with all its baneful effects is rapidly increasing in spite of all the efforts being made by public health organizations and our scientific societies to combat it. Recent reliable investigations along this line establishes the fact that nearly twenty-five per cent of the children in the graded schools have severe and conspicuous cases of malocclusion. Orthodontia should become better known and appreciated not only by the medical and dental sciences but by the laity. The sympathy and assistance of all must be enlisted if the greatest degree of benefit is to be conferred upon humanity. There is no phase of human activity where ignorance or a little knowledge is so dangerous as

it is in the field of hygiene and public health. It is, therefore, our real duty to carry truth and life to all by teaching, correcting, and making more efficient men. It was with this idea and duty in mind that I took the liberty of appointing an educational committee at the beginning of my régime. It is needless for me to elaborate on the duties of this committee and its possibilities for doing constructive work. You will hear a report from this committee at the regular business session and it is prepared to speak for itself in the most creditable manner. It has been doing some research work, which will be covered in a paper by Dr. H. B. Robison on "Malocclusion and Insanity." This committee has a surprise for you and if you fail to hear this report from the educational committee you will miss one of the greatest inspirations you can possibly get out of this whole meeting.

There is another matter to present for your earnest consideration which may at first appear presumptuous and premature. I did not expect to make mention of it, but it appears so sensible and reasonable that I cannot pass up this opportunity of bringing it to your attention. It seems that the time has about arrived for a partial reorganization of the American Society of Orthodontists. It is now operating under the same executive plan as it did when it was first organized, nearly a quarter of a century ago when it had considerably less members than we have in our society at the present time. There are now to my knowledge five reputable district orthodontic societies doing valuable work, but functioning independently of what should be more regularly recognized as the parent organization, the American Society. The district societies should be more clearly and definitely recognized as component societies of the American Society of Orthodontists and the constitutions of the several societies amended to this effect. It should be further provided that each society have a representative on an executive body. The constitution and by-laws of the district societies should be forced to measure up to a certain prescribed standard. It does not necessarily mean that the qualifications for admittance to membership in the district and American Society have to be of the same standard. The American Society has no regular standing committees aside from the board of censors, while other kindred organizations have found it practical and beneficial to have educational, research, and membership committees.

As the demand for orthodontic service grows, so is there a corresponding tendency for some men to popularize and commercialize it. These adventurers are using the most cunning and shrewd methods for practicing deceit upon the general practitioner. They are organizing clubs and societies and might choose a name that would be misleading to the dental profession. They could select a name of a geographical character and we would be placed upon the same level, in so far as the name is concerned, in staking our reputation against them without being regularly recognized as an auxiliary of the American Society of Orthodontists. My idea is of a plan similar to that of our dental organizations. I would not have anybody believe that we are disgruntled at the past or present management of the American Society, when we have always had and have now the most friendly and sympathetic

feeling. I wish it to be clearly understood that this is purely a friendly suggestion made in the interest of organized orthodontia and firmly believe such a plan will be adopted in the next few years.

With the 1925 meeting of the American Society of Orthodontists next week and the International Orthodontic Congress being organized for the 1926 meeting, it would, of course, not be practical to put such a plan in operation until 1927. This is submitted with the hopes that the Southwestern Society consider its possibilities in this connection, and be credited with launching the movement and thereby receive credit for having made another real contribution to organized orthodontia.

In conclusion, I wish to express my heartfelt thanks and appreciation for all the assistance I have received from the members during the past year of my administration. I could not help but marvel at the splendid spirit of service to be found on every hand.

If it were not for our ability to make friends we would not be worthy of our existence. A number of our very good friends have contributed much towards making this meeting a success. We are very grateful to them and hope we may always prove ourselves worthy of their friendship.

WELCOME ADDRESS TO THE SOUTHWESTERN SOCIETY OF ORTHODONTISTS, TULSA, APRIL 8, 1925

By John M. Temples, D.D.S., Tulsa, Okla.

WE are indeed glad to welcome your association to the city of Tulsa. We like to have men meet in Tulsa who stand for high aims and who accomplish worth-while deeds and we regard orthodontia as one of our leading sciences.

As the director of a sight-seeing trip I will begin by drawing your attention to the admirable Mayo Hotel which has just been constructed at a cost of about $3,000,000.00. This hotel is located in a new city that has quite recently been built up by a citizenship from all corners of the globe. We have residents from the North, South, East and West, who have within the last few years come to Tulsa and built probably the most truly American city. In this city we have wonderful institutions. We have strong professional people; we have beautiful homes and a great school system. I would like to dwell for a few moments on our school system. It is uniquely built so far as physical properties go. Our buildings are constructed so as to offer the least possible fire hazard and our playgrounds are big enough that our children can have some sunshine and fresh air. Our high school probably ranks as one of the best in the United States and we have been fortunate in having splendid directors and teachers. We have an outstanding man as our superintendent in the person of Dr. P. P. Claxton, who for ten years directed the education of the United States under the name of Commissioner of Education. In our schools we have a health department of which we are justly

proud. It is presided over by a health director under whom are several nurses and a dentist, all doing wonderful work to promote the physical welfare of children who might be losing time by having to repeat their grades but who, owing to this efficient service, are keeping abreast with the children of better physical opportunities. This year we have done many hundreds of tonsillectomies and removed thousands of deciduous teeth that needed to be removed. We have treated many children in other ways to bring up their physical standard as best we could, therefore, I say we are justly proud of our city and our schools.

I cannot dwell longer on these points of interest about our city but must pass on and tell you something of a small group of people I met on the street this morning, who are intensely interested in this association and who were discussing this meeting in a tone of voice that attracted my attention. I ventured into the crowd and introduced myself and found this group consisted of two families, one known as the "Clast" family and the other the "Blast" family. Upon closer conversation I learned that one was "Osteo" and the other "Cemento" Blast, the former gentleman being known as "Osteoclast." They were relating their experiences and some of them seemed to have been interested in orthodontic service for a long time. "Mr. Osteoclast" complained that he had been imposed upon in past years by having appliances of force and pressure brought on his field of service in a way that was irritating and exasperating to him. "Osteo Blast" spoke up and said that he had had more to do than he could possibly get done in the days of old when he was expected to fill in excavations that had been made in a certain length of time; he found that he had not been given enough time and confessed openly he had never done his work well up to the present time. Another gentleman was introduced who was long and lanky and scarred. He said that he had been traumatized and injured until he had sometimes been practically overcome by enemies known as the "Strep" family who were always tagging after a fellow when he was somewhat down physically. When this discussion ended we noticed a new face in the crowd and he had listened with intense interest; he told these men they must be relating experiences of years ago for now it was different; instead of the old pulls and tugs and injuries brought about by the use of the arch bar and the ligature wire, the present body of men is now employing bands with appliances secreted in the mouth so they could not be seen. These appliances were constructed so that they gave the force so gently with their lady-finger pressure that the burdens of the "Clast" family and the responsibilities of the "Blast" family had ceased to be burdens and had grown into pleasure instead. He said that he had found that many "Osteo Blasts" reported they could do their work perfectly and have time to spare from their respective responsibilities, and one even went so far as to say he had time to go fishing and do his job on time. He said that "Normal Blood Supply" was now a man among men and while he had been prevented from doing his full duty in the past by the interferences already mentioned, he now had full sway and furnished all the requirements of lime, blood and other things necessary to the action of the "Blast" and "Clast" families. So this brought on reminiscences and upon investigation it was

found that one party who had been meeting with this group from year to year was not in evidence and some one who remembered him suggested that his name was "Retaining Appliance," and that in this new order of things he had found it unnecessary to present himself as he was no longer a member of the group. After the explanations made by "Normal Growth" there was a different atmosphere in the group and they all agreed that life presented a different vision. Then they turned to me as someone who had been delegated to speak to you this morning and asked me if I would represent them in coming before you and bid you welcome for them, and so in their behalf I do welcome you as well as in the name of all the other citizens of this fair City of Tulsa.

ETIOLOGY OF THE ANOMALIES OF THE TEETH AND A NEW AND SIMPLIFIED METHOD OF TREATMENT ON THE BASIS OF THE KNOWLEDGE OF ETIOLOGY*

By Dr. A. Kadner, Hamburg, Germany

ORTHODONTIA or orthopedy of the jaws is the youngest branch of dental surgery, which up till now, I dare say, is not yet past its infancy. In this field of research we are trying to search, with the help of the correlated sciences, scientific explanations of orthodontic questions. Especially is this the case in etiology and diagnosis of the deformities in the position of teeth. So far our highest aim has been the improvement of apparatus. Many writers have not failed to make theoretical researches also, but, I may say, they all had no reliable scientific basis; for such principles cannot be solely nor even chiefly founded on anthropology, pathology and so on, though these surely must be taken into consideration. The solution of the problem, however, must come from a science which hitherto nobody has applied to orthodontia, and that is biology, the doctrine of evolution. In this way only, I believe to be able to show the problem of etiology, till today spoken of as insoluble, can be solved. All methods which have been used up to the present are the result of symptomatic classifications. Even today well-known orthodontists are heard to state that the classification of irregularities can only be made symptomatologically because the etiologic problem of them has not yet been solved. I think the study of etiology would have made better progress if the investigators had not lost their way in searching for all possible pathologic influences on the structure and deformities of the jaws or the position of the teeth. They would have been more successful if they had, in the first line, studied by which biologic laws the normal formation comes about, and after this had stated the anomalies. Without any hesitation they considered each anomaly of position as caused by pathologic and exterior influences and searched only for these. Even the well-known fact of frequent inheritance of anomalies in families did not induce them to comply strictly with the laws of inheritance.

*Proceedings of the European Orthodontological Society, 1922.

Many of them, not believing in inheritance of acquired qualities, even denied inheritance totally.

The word anomaly, expressing a deviation from the normal, is easily understood as meaning a pathologic condition only. But this is incorrect. For reading about statements on similar anomalies within a family, it ought to be clearly noticed that in such cases pathologic anomalies have been inherited Here a marked contradiction is present.

It is almost astonishing that no researches have been made in this direction. Apart from this, the circumstance that hardly anybody has crossed the limits of our special field must be regarded as restraining progress in our special science. Looking at the neighboring departments of medicine and natural sciences, we find long years ago statements on the inheritance of different organs. In 1907, Davenport showed that the color of the eyes is inherited according to regular laws, namely, according to the Mendelian laws, which Mendel derived from his studies in plants in 1866. These Mendelian laws are now generally looked upon as the fundamentals of the problem of heredity.

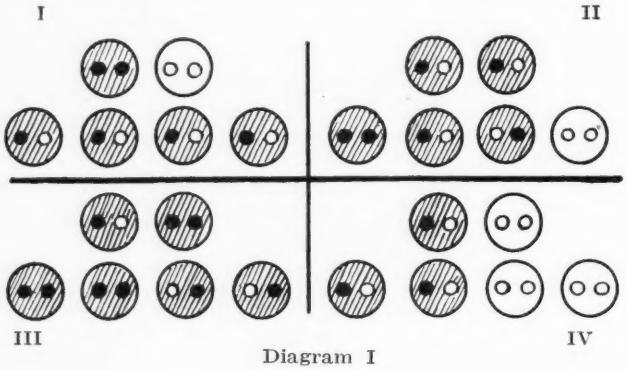

Diagram I

So it will be necessary for a better understanding to give a short and only very elementary explanation of these.

Mendel crossed red-blossomed peas with white-blossomed and found that the whole daughter generation was red-blossomed, quite in the original hue (Quadrant I); out of which results, that the red germ is biologically predominant over the recessive white. If these were propagated by self-imprimation (Quadrant II), 75 per cent were red-blossomed, whilst 25 per cent were white-blossomed. This result obeys the laws of the mathematical calculus of probability. In further cultivating the red daughter individuals of Quadrant II only, the following generation proved red without exception (Quadrant III). Moreover, a red mother plant of Quadrant II combined with the white plant, furnished an equal number of red and white individuals (Quadrant IV). Thus the dominant red may be transmitted either by one of the parents or by both of them, whilst the recessive white must always be transmitted by both. Mendel's laws as mentioned above were applied by Davenport to the question of the color of the eyes. He found that when brown-eyed are crossed with blue-eyed and grey-eyed, the brown dominated over the blue and the grey, and again the grey over the blue; that means the darker over the lighter. And so a lot of similar researches done by zoologists all had a corresponding result, confirming Mendel's laws.

As a special case I mention that in 1911 Häcker showed that prominence of the mandible is dominant in the male sex of the family of the Hapsburgs, which I shall refer to later on.

This much seems to be certain: the descendants receive from the ovum as well as from the sperm the germ layers of the respective organ or part of organ always *in toto* and no mixture of germ layers of any sort. Such mixtures, however, seem to occur in exceptional cases, in which intermedial forms or qualities are to be found. This is, for instance, the case with the color of the skin, which cannot as yet be explained by Mendel's laws. But anyhow, as a rule the germ layers were found to be inherited dominantly or recessively from one of the parents. Whether dominance and recessivity will be of any importance for what I am going to explain to you now will be seen.

As to the question of heredity in respect of the forms of jaws and teeth, I beg to give you the results of a series of researches which I have settled in my paper: "The Problem of Heredity with Regard to Anomalies of the Position of Teeth." I may say beforehand that the laws of heredity which rule the inheritance of other organs also prevail in the heredity of jaw-structure.

To state now whether anomalies of position of the teeth can be inherited, I examined a fair number of families, taking impressions of the set of teeth of all members of these families and measuring out the models I got in this way. For measure points I chose those points which are usually taken; this means always the same points of the molars (the central depression), premolars (the middle of the fossa) and canines (the point). If the respective teeth are allowed to cut through in their natural position, these points mark the middle of the alveolar bone. When a tooth was missing I placed the points of the compasses on the middle of the alveolar bone and got nearly the same number of millimeters as if the respective tooth were in its place. Always taking the same points between the branches of the compasses and arranging the millimeters gained in a row, beginning with the second molar and continuing to the canine, I was able to get a picture of the whole breadth of the arch or jaw. You will see the measures which I found in the following tables. The families are always arranged together, so that you plainly see the similarities. Not being able to show all the tables which you will see in the paper mentioned, I will just explain the following cases to give you an idea of the whole research.

All four daughters show the same breadth of the lateral parts of the maxillary jaw and the mandibular jaw as inherited from the father, but the same structure of the intermaxillary of the mother. The father has a broad intermaxillary, whilst this bone of the mother is pointed like a gothic arch. Therefore, all four daughters show the same articulation of the set of teeth, a so-called prognathy, though we find with the parents a normal articulation.

The one daughter inherited the lateral parts of the maxillary jaw and the mandibular jaw from the father, the other daughter from the mother. Both inherited the intermaxillary from the father. With the daughter (No 4), therefore, the canines erupted external to the arch.

	NO. 1 FATHER	NO. 2 DAUGHTER	NO. 3 DAUGHTER	NO. 4 DAUGHTER	NO. 5 DAUGHTER	NO. 6 MOTHER
MAXILLARY: BREADTH AT—						
the 2 molars	52	—	53	53	—	
" 1 "	46	46	45	46	46½	much
" 2 premolars	42	41	40½	39	41	smaller
" 1 "	36	37	35	34	35	
" canines	35	34	33	32	32	
MANDIBULAR: BREADTH AT—						
the 2 molars	53	53	—	53	—	
" 1 "	44	44	44½	45	44	much
" 2 premolars	38	35	38	38	38½	smaller
" 1 "	33	31	32	33	32½	
" canines	26	25	26	27	26½	
INTERMAXILLARY:	orthognath broad			prognath pointed (gothic) arch		

	NO. 1 FATHER	NO. 2 MOTHER	NO. 3 DAUGHTER	NO. 4 DAUGHTER
MAXILLARY JAW: BREADTH AT—				
the 2 molars	47	50	47	49
" 1 "	43	44	42½	44
" 2 premolars	36	39	37	38½
" 1 "	33	35	32½	34½
" canines	28	32	28	32
MANDIBULAR JAW: BREADTH AT—				
the 2 molars	48	50	48	49
" 1 "	42	43	42	43½
" 2 premolars	37	40	37	40
" 1 "	30	31	30	31
" canines	27	24	25	25
INTERMAXILLARY	prognath gothic	orthognath broad	prognath gothic	prognath gothic

	NO. 1 FATHER	NO. 2 MOTHER	NO. 3 SON
MAXILLARY JAW: BREADTH AT—			
the 2 molars	61	53	—
" 1 "	54	49	54
" 2 premolars	47	40½	48
" 1 "	41	35	42
" canines	40	33½	40½
MANDIBULAR JAW: BREADTH AT—			
the 2 molars	53	49	—
" 1 "	47	43	46½
" 2 premolars	40	37	39
" 1 "	33	29½	33
" canines	27½	25	28
INTERMAXILLARY	prognath broad	orthognath	orthognath
BREADTH OF TEETH	$_1J_1 = 10$ $_2J_2 = 8$	$_1J_1 = 8$ $_2J_2 = 6¼$	$_1J_1 = 10$ $_2J_2 = 8$

Father and son show the same extraordinarily broad jaw, whereas the mother furnished the intermaxillary. The latter being orthognathous, the former prognathous, a so-called "progenia" developed out of it. In most of such cases of inheritance we find the distal bite caused thereby. The teeth of the son have inherited, together with the form, exactly the same direction of growth; the mesial edge of the middle incisive teeth is turned downward to

the palate, which can be distinctly seen. The forms of the jaws and the articulation are well to be seen on the following table. In the first row you will find in enlarged scale a prognathous bite of the four daughters, but the parents have good occlusion. In the second row No. 1 was equal to No. 3, and No. 2 (mother) furnished the lateral parts of the maxillary jaw and the mandibular jaw to No. 4, but the intermaxillary of both children (No. 3 and No. 4) originates from the father.

In the picture shown you can see three jaws which show a "progenia" in consequence of the explained phenomena of inheritance in the case of a woman, her father and her daughter. Next to it there is an extraordinary narrow jaw with a high palate. The whole formation of this skull is easily recognized as being a skull of English race.

It is a case of occlusion with buccolingual shift, a peculiarity of this race and of the Scandinavian. The brain and the face-part of the skull are very long, narrow and in all parts well formed. One might think that nose-breathing would be hampered by such a high and narrow palate. But this is in no way the case; the patient has never been a mouth-breather. One of his maternal ancestors came from England; he inherited her jaw formation.

A series of models may serve as a critical illustration against those breadths of the arch which Pont and his adherents demand. At the first four models of this row there exists a completely normal occlusion, whilst the mandibular jaw of the fifth model is distally shifted on the right side for three-quarters of the breadth of a premolar (after Angle, Class 2, Division 2, Subdivision 2).

Let us have a look at the indices of breadth after Pont's idea.

	1	2	3	4	5
	$J_1 = 9$	$J_1 = 8\frac{1}{2}$	$J_1 = 9\frac{1}{2}$	$J_1 = 8\frac{1}{2}$	$J_1 = 9$
	$_1J = 9$	$_1J = 8\frac{1}{2}$	$_1J = 9\frac{1}{2}$	$_1J = 8\frac{1}{2}$	$_1J = 9$
	$J_2 = 7\frac{1}{2}$	$J_2 = 7$	$J_2 = 7\frac{1}{2}$	$J_2 = 7$	$J_2 = 7$
	$_2J = 7\frac{1}{2}$	$_2J = 7$	$_2J = 7\frac{1}{2}$	$_2J = 7$	$_2J = 7$
	Sa = 33	= 31	= 34	= 31	= 32
After Pont—	Mol. P'm.	Mol. P'm.	Mol. P'm.	Mol. P'm.	Mol. P'm.
	51,5; 41,0.	48,4; 39,0.	53,0; 43,0.	48,4; 39,0.	50,0; 40,0.
Really is—	45,0; 35,5.	45,5; 36,0.	44,0; 34,5.	43,5; 35,0.	50,0; 39,5.

The first four, indeed, in spite of their supposed abnormal breadth of jaw, show a good articulation, but with the fifth—normal after Pont's idea—an abnormal articulation is to be found. In the fourth "too narrow" arch there exists even slightly marked diastemata in the front. The fifth is too narrow in the front and the canines surmount the lateral incisive teeth, so that the front is retruded, whereby the distal bite was caused.

After my explanation, the first four are completely normal, and in the fifth case either the teeth are a little too broad for the arch or the intermaxillary is too orthognathous in proportion to the lateral parts of the maxillary jaw, so that, secondarily, the bite, whilst moving to occlusion, got distally shifted.

Pont's index holds good only for a small group of arches, but completely fails in face of those numerous variations caused by the mingling of races. For—even from a purely mathematical point of view—a lesser breadth of arch, together with the same breadth of teeth, can very well correspond with a larger height of the arch, as for instance the length of an elliptic quadrant can be the same in spite of different proportions of the greater and the smaller axes. *(See Diagram II.)*

We are not allowed to consider as normal such an arch, which has been deduced by speculative calculation only, nor may we use it as a standard by forcing all the arches into this supposed normal breadth. Such a way of proceeding is not able to render a treatment more easy, but certainly more difficult. The different breadths of the arch and their shapes are peculiarities of the race and of the individual type.

In all cases the lateral parts of the maxillary jaw, together with the whole mandibular jaw, were inherited from the one parent in the whole formation of the bones, whereas the intermaxillary originated either from the same or from the other parent. And this exactly corresponds with the de-

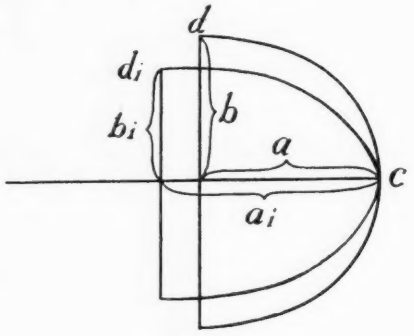

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Diagram II

velopment of the parts of the jaw. For out of the first branch is formed the mandibular jaw as well as the apophysis of the maxillary jaw. The halves of the mandibular jaw join in the middle line, whilst upward two more apophyses get formed, which develop into the maxillary jaw, reaching to the canines. Between these there remains for awhile a fissure into which grows from above the apophysis of the maxillary jaw with the septum of the nose, vomer and intermaxillary, and later on joins with the lateral parts. Thus the lateral parts and the mandibular jaw originate from one and the same germ, namely from the lateral part of the cavity of the cephalic intestine, whereas the intermaxillary has its special germ, namely the frontal apophysis which develops out of the cerebral germ. And this is the biologic explanation for what I state by my measurings, namely that the lateral parts of the maxillary jaw and the mandibular jaw always originate from one and the same parent. Only in a single case a son had inherited the maxillary jaw from the mother and the mandibular jaw from the father.

There remains the question whether this law tallies with Mendel's laws. It does. Mendel, and after him other scientists, have affirmed the inheritance of the germs for the organic parts, and as to the jaw and the teeth,

their laws can no longer be doubtful after the results which I have the honor to explain to you. But I cannot decide what is dominant and what recessive. Mendel's law is based upon the "law of great numbers." The material which I had the possibility of using so far is, of course, not any way near sufficient for the application of these laws. But I trust this will be the case after further investigation has been carried on for a longer time and on a larger scale.

Häcker has proved that "progenia" predominates with the Hapsburgs in the male sex, but that does not justify the presumption that this should be so in all cases. For I have shown that in one case "progenia" had been transmitted from the father to the daughter and had been inherited by her daughter again; in another case "progenia" had been transmitted from a father to the son and to the daughter as well.

Concerning Mendel's laws, I presume that there exists a single germ for the mandibular jaw and the lateral parts of the maxillary jaw as being always inherited from only one of the parents. That single case amongst so many where the maxillary jaw originated from the one and the mandibular jaw from the other parent, I am induced to consider as a variation of the germ.

These two questions most undoubtedly are of the greatest interest for science and ought to be further investigated. But for a dentist some knowledge about the inheritance of the different parts of the jaws is of a more practical interest, as it opens the way for the etiology of most of those anomalies of position of the teeth which hitherto nobody has explained. At any rate we now know how the normal formation of the jaws comes about, and as this, in those many cases shown by me, is caused by normal growth, and that the individual parts normally inherited do not fit together in such a way as to allow a normal occlusion, it is not a question of pathology at all in these cases.

Most certainly there do exist anomalies of position of the teeth and the jaws of a pathologic character. But henceforth these may be the more easily recognized; for we have now the basis from which these really pathologic cases can be studied, namely, by comparing them with the parents or sisters and brothers and then studying the deviations from the normal. We shall always find the same anomalies caused by the same influences. Thus we also can gain both an exact diagnosis and a scientific classification of the anomalies. Most of the cases will come about in such a way that all parts get normally inherited but are not sufficiently congruous to form a harmonic whole, i.e., a normal occlusion. One might say it was caused by normal disharmonic growth.

The rest is pathologic. I have already studied a series of what are usually accepted as causes. There is, first of all, mouth-breathing. Mouth-breathing alone or in conjunction with pressure of the cheeks, lips or tongue is never the cause of anomalies, but is merely secondary. A great number of these cases I have already shown as normally but disharmonically inherited. Bad habits, as sucking of the thumb and so on, will only cause anomalies in position of the teeth, but not such of the jaw-bones, and even then only if this habit continues till past the change of teeth. Causes of this type are to be counted

amongst the traumatic. Of the same type are those caused by early extraction of single teeth.

Much more difficult will be the explanation for those cases of pathology caused by diseases. But I am sure that even these deformations are not the consequence of exterior influences, as for instance the pressure of the cheeks combined with softness of the bone is said to be the cause of a contraction of the bone. I believe that this narrowness only comes about in consequence of a disturbance of growth. The statements of Schröder-Benseler and Franke have proved that the jaw grows in breadth only up to the fifth year of life and henceforth gets shifted forward. If growth is hampered during this time, as in case of rickets, scrofula and syphilis, narrow jaws are the consequence. The reason is the disturbance of growth, which now can be scientifically explained by the failure of the glands of internal secretion. With these children the jaws do not harmonize in those parts which develop at the time of life when the aforementioned diseases are active. A more recent theory pretends that sub- and superactivity of the chewing function have a transforming influence upon the form of the jaws. But how can this theory explain the following fact: I have found in several cases of cleft palate that, though the foremost parts of the maxillary jaw were naturally exceedingly narrow, the mandibular jaw was of quite a normal breadth, just like that of one of the parents, though chewing functions in these parts are impossible.

Landsberger has shown, in a long series of researches, that the mandibular jaw of puppies from whom he had extirpated the dental germs of the maxillary jaw nevertheless develop normally. The maxillary jaw was undeveloped, as no possibility was given for the formation of the alveolar bone. And what happened? An enormous enlargement of the lower nostrils! And why? From the center of growth the energy of growth had been transfused into these parts. It is this direction of growth which nature communicates to the germ and which the parents transmit to the children.

My method of research might provide a broad basis from which the pathologic cases will soon find their explanation, by first of all comparing them with those of the parents and then studying the deviations from the normal. Furthermore, we have now a scientific classification from the etiologic point of view which hitherto has been completely impossible. For we now know that the majority of anomalies have a biologic cause (in contrast to those of a pathologic nature, which originate from trauma, immature extraction, bad habits, diseases and so on). We also are now able, by systematic measurings of the jaws with or without anomalies, but always of those of whole families, to fix exact rules after which the formation of anomalies of position come about. If there is the question of a really pathologic deformation we are now able to state the causes, because the same anomalies are always the consequence of the same influences. We can put up a system which shows whether an anomoly has been inherited or acquired. At the same time, diagnosis can now be put on a reliable basis.

In future, the orthodontist will avoid spending much time and considerable means on lateral expansion, at least in the majority of cases. But what is to be done now? The answer to this question easily results from the simple

law given by me above. We apply to the child a standard consisting of: firstly, lateral parts of the maxillary and the mandibular jaw; secondly, the intermaxillary; thirdly, teeth; and all this in the necessary proportions on the basis of the inherited parts. This means saving time and work for the dentist, and for the patient a lot of trouble and dismay, so extensively connected with Pont's treatment of forcing the lateral parts into the so-called normal index breadth. I have now used this method for a long time, and I am quite astonished in how short a time and with what a minimum of trouble the regulation can be done.

By the way, perhaps this law of inheritance will soon become of some value for criminal science and practice. For instance, there is a case of identity before the Court: two couples claim a little boy as their own, as has really happened. My way of deciding this sometimes rather awkward dilemma would be the following. There are, for instance, the lateral parts of the maxillary jaw of the child in question:

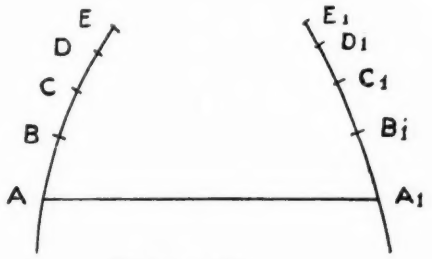


Diagram III.

A and A_1 are the middle points of the 1. molars measured in the central depression.
B and B_1 are the middle points of the 2. premolars measured in the middle of the fossa.
C and C_1 are the middle points of the 1. premolars measured in the middle of the fossa.
D and D_1 are the middle points of the canines measured above the tuberculum.

If a tooth did not cut through at its right place, the corresponding point, that is the middle of the alveolar bone, must be taken.

On the celluloid plates are drawn the lateral parts of the maxillary jaw of the two claiming couples. If you put these plates upon the design you will easily recognize one of the real parents. In this case it is one of the fathers.

DISCUSSION

The President said one of the most important of etiologic factors was heredity and its general influence upon cases. The enormous material which Dr. Kadner had brought forward was very valuable, and when printed would be interesting to study. It contained so many important things that it was not possible to grasp the whole subject just by listening to it. The society was greatly indebted to Dr. Kadner for having taken the trouble to come over to England and read his paper.

Dr. Hipwell said the models shown, and the amount of work required to get them ready, must have caused Dr. Kadner to burn a good deal of midnight oil. In New York there was a method of making models which produced a model like marble, and with Dr. Northcroft's machine the model could be made in twenty minutes. It saved a good deal of time, and the model was a lasting one. He was sure that every member would study the paper very carefully because they realized its scientific importance. He was well aware of the amount of work Dr. Lind was doing in a scientific way, and whenever he saw an article by any of the Continental practitioners he always gave up an evening to reading it.

Dr. F. Aguilar thought there had been perhaps too much reliance placed on the cast in connection with malposition of teeth, and some forgetfulness of the importance of the intrinsic causes and hereditary causes. The doctor had drawn attention to the laws of Mendel and had tried to apply those laws to the investigation of malposition of teeth; that was to say, to demonstrate how the predominant element could influence the abnormality. It could be seen that Mendel's principles, which were accepted scientifically everywhere, furnished an explanation, not only with regard to the variation of the somatic characteristics of the members that formed the junction, but how certain anomalies were transmitted. In the Hapsburg family it was possible to study perfectly well, through many generations, the production of mandibular prognathism. The peculiarity which produced the Hapsburg type should really be called Castilian because it originated in John of Castile and was transmitted to the Portuguese family and from that family to the Hapsburg family, and it could be seen reproduced in all pictures of that family. It was possible to trace the conditions of the teeth of the Hapsburgs and their successors and see how they were predominantly transmitted by the female sex more than by the male. The pro-

Fig. 1.—Mary of Burgundy.

trusion of the mandibular jaw was so great in Charles V that it made him unhappy during the last days of his life because he could not bite, and had to drink through a tube. Those characteristics were reproduced in many families, in the Stuarts and in the Valois, as soon as one of the members of the Hapsburg family married into families in France, Italy, England, Spain or other countries. Therefore, in the study of pathology and heredity, the reigning families offered some characteristics that could not be studied in other families. Remembering the fact that the woman had been the means of transmitting the anomaly through the reigning families, it would be seen to be of great value in fixing the etiology of certain dental anomalies especially the prognathism of the mandibular jaw. That prognathism was always associated with the protrusion of the eyeball, and that led to a consideration of the influence effected by the alteration of the ductless glands. Dentists had not realized the importance of heredity in the production of abnormalities in connection with teeth. He was not speaking of abnormalities produced by physical causes or acquired abnormalities from mouth-breathing and thumb-sucking. He congratulated the author upon the importance of the point he had brought forward. Hemophilia was possibly another example in connection with transmission by the female sex, and only to the males, and the males did not transmit that abnormality. He would encourage the author to pursue his investigations.

Dr. O. Rubberbrecht: I do not think correct the assertion of Dr. Aguilar that the lower prognathism of the Hapsburg family was only transmitted by the female members of this family. All the present members of the House of Hapsburg descend from Philip the Fair and from Joanna of Castile. Philip the Fair was the son of Maximilian of Austria and Mary of Burgundy. We find so on the origin of the house of Hapsburg, the houses of Austria, of Burgundy, and of Spain.

House of Burgundy	House of Austria	House of Spain
	Frederick III (1415-1493)	Ferdinand (1452-1516)
Mary of Burgundy, + 1482,	marries Maximilian I, + 1519	marries Isabella (1451-1504)

Philip the Fair, + 1506, marries Joanna of Castile (1479-1555)

Elesnora · Charles · Elizabeth · Ferdinand · Mary · Catherine

Fig. 2.—Philip the Fair.

Fig. 3.—Margaret of Austria.

None of the Dukes or Duchesses of Burgundy was prognathic. A series of authentic portraits of these sovereigns do not allow the slightest doubt about that question. There are a number of contemporaneous portraits of Mary of Burgundy (Fig. 1), some excellent, and not one shows the existence of lower prognathism. Maximilian I of Austria, the husband of Mary of Burgundy, was prognathic. His father, Frederick III, presented the same anomally in a very marked degree. From the marriage of Maximilian of Austria and Mary of Burgundy were born Philip the Fair and Margaret of Austria. It is difficult to say with certainty whether Philip the Fair (Fig. 2) was prognathic or not. It is not always possible to make a sure diagnosis of maxillary anomalies by the examination of portraits only. Even nowadays we cannot always diagnose such anomalies by examining only the outer features. Margaret of Austria (Fig. 3), daughter of a prognathic father and of a *nonprognathic* mother, had a very marked lower prognathism. Philip the Fair married Joanna of Castile, a prognathic princess who belonged to a family where lower prognathism can be followed in several generations upwards. Six children were born from this marriage: four of them had a very marked lower prognathism. The discussion on this subject could be continued a very long time. I think that what I

have said is sufficient to establish the fact that lower prognathism can be transmitted by male as well as by female persons.

Dr. d'Alise mentioned two cases where abnormalities had been transmitted by the father, and pressed for more attention to be paid to hereditary causes.

Mr. Harold Chapman said that although many cases were met with in practice in which heredity seemed to play a part in producing certain definite anomalies, it seemed to him a long way from that to saying that the maxillary jaw in a certain individual was inherited from one parent and the mandibular jaw from another. It made him wonder why any parts of a man fitted together at all. He wished to express his thanks for receiving an invitation to attend the meetings of the society to hear the very valuable papers that had been presented.

Mr. Cale-Matthews joined with Mr. Chapman in thanking the society for their kind hospitality.

The President said that the society was very pleased that it had been able to attract so many eminent men as guests. The progress of orthodontia had been very great during the past few years and the time had come when the society must grow. New men were needed because new men meant new ideas and work for the progress of orthodontia.

Dr. Kadner said he had shown that the abnormality of the lower jaw was not always transmitted by the female but was transmitted also by the male sex, and he had desired to show the basis on which it was possible now to investigate influences which could produce an abnormality.

The illustrations are reproduced from Dr. Osw. Rubbrecht's *L'Origine du type familial de la Maison de Habsbourg.* Bruxelles, G. Van Oest et Cie, 1910.

SYPHILIS, TUBERCULOSIS, RACHITIS AND MALOCCLUSION*

By Dr. C. D'Alise

THE purpose of this note is a double one: First, to submit to your notice and discussion some new ideas and facts in the field of etiology of dental malocclusion; second, to show that if we, stomatologists and orthodontists, earnestly intend to cooperate to the healing of the human race, we must study our specialties as branches of medicine and surgery, and in intimate collaboration with general medicine and with other specialties.

Can we, stomatologists and orthodontists, declare our satisfaction with our work while seeing that 99 per cent of our school children have decayed teeth, and that malocclusion is the rule rather than the exception, as is stated by Angle?

We do not yet know the real etiology of caries and of pyorrhea, and some of the causes of dental malocclusion are known to us only, but we are not in a condition to prevent them by the knowledge we have of their etiology.

In a study which lasted during nearly four years on children from three to fifteen years of age, belonging to an orphanage, in which I tried to follow the relations between tuberculosis, syphilis and the dental system, and whose results I read before the Royal Medico-Chirurgical Academy of Naples last June, I showed that among 206 children medically examined and having used all the biologic and chemical tests (including the Wassermann and Pirquet reactions), 146 of them, i.e., 71 per cent, were affected by malocclusion (16 belonging to the first class of Angle's classification, 56 to the second class, 6 to the third class, and 68 to a complicated type (open bite, edge to edge, etc.).

If we consider that these malocclusions, besides spoiling the facial esthetics, are more or less reducing the capacity of the oral cavity and the efficiency of mastication, and causing all the other ominous consequences belonging to such causes, we can well imagine how serious are the actual physical and mental conditions of our children.

In front of such a grave situation, therefore, can we declare ourselves satisfied with the progress of orthodontia? Our victory seems to me to be like that of Pyrrhus.

We are boasting of our successes and of our technic before our congresses and our academies, while exhibiting our theories, but whoever dares to denounce his own failures and frankly to declare our ignorance?

Orthodontia has most certainly achieved huge successes in the last thirty years, so much so as to become a real science like the other medical specialties. In the field of macroscopical anatomic pathology, Cryer and Bogue were those who especially called attention to the constant relations between dental malocclusions and the corresponding facial and skull deformities; while Baker

*Proceedings of the European Orthodontological Society, 1922.

and Landsberger demonstrated the action of the teeth on the facial and cranial development by their important works of experimental animal pathology. Oppenheim, on the other hand, scientifically showed how the mechanical stimulus we exercise on the teeth transform and modify the bone tissue of the jaws.

Angle finally gave the greatest impulse to the development of modern orthodontia by the study of its pathogenesis, etiology and therapeutics, while creating instruments, tools and a wonderful technic. Notwithstanding, however, such a progress of the new science, facial deformities most alarmingly increase and become worse. So much so that we are bound to declare our impotence not so much in their correction as in their prevention.

It is the aim of hygiene, which is a synthesis of all medical knowledge, to prevent malocclusions as well as other infirmities. Hygiene expects to possess a deep and precise knowledge of the causes of illnesses, but in regard to the etiology of malocclusions we are still behind.

Angle, in his book on "Treatment of Malocclusion of the Teeth" (seventh edition, 1907), called our attention to the embryologic causes, which might determine malocclusions; and having enumerated the causes, known at that time: (1) premature loss of deciduous teeth; (2) loss of permanent teeth; (3) imperfect fillings, crowns, etc.; (4) prolonged retention of deciduous teeth; (5) early eruption of permanent teeth; (6) supernumerary teeth; (7) transposed teeth; (8) lack of function (disuse); (9) habits; (10) abnormal frenum labii; (11)nasal obstruction, etc.; he stated that much is still to be done in the field of etiology.

What progress, then, has been achieved in the etiology of malocclusion in the last fifteen years? We still believe that the causes of malocclusions are those quoted above, while nearly all are dependent on constitutional faults, of which dental diseases are only a manifestation. Given our modern scientific views, we cannot doubt any more hereditary causes as etiologic determining factors of malocclusions. Such axiom is hardly placed in doubt by anybody, and still less by us stomatologists, who are daily seeing the evidences of it. Syphilis and tuberculosis have been, and are still, considered by many as direct or indirect causes of malocclusions. But I could not absolutely accept such a statement, and have tried to give the reasons of such an opinion in my paper quoted above. These illnesses, however, both by their frequency and by their deleterious action on the development of the human organism, vastly contribute to the causes of dental and maxillary anomalies. Besides syphilis and tuberculosis, however, rachitis (or English illness, as it was called at first) affects orthodontia very intimately. We all know rickets to be a disease of the skeleton in formation, which appears between the second half of the first and the end of the second year of life, according to some; and between the first and the fourth year, according to others. In the poor quarters of large cities in Germany it affects ninety or more per cent of all children, according to Professor Hoetzner. The most characteristic symptoms of rickets relate to the skeletal system.

We know that the relation between face and skull is one to eight in the newborn baby, while it is one to two in the adult. The normal development

of the facial skeleton is altered in rickety subjects, so much that facial bones develop after those of the skull. The dental arch is transversely reduced while sagittally it is prolonged, and in the median line ends like a beak (2nd Class, 1st Division, Angle classification), or the anterior teeth are strongly inclined lingually (2nd Class, 2nd Division), and often their incisal edges are in contact with the vestibular gum of the mandibular, while the alveolar processes are divergent and outwardly inclined in the posterior part. The mandibular jaw is shortened sagittally and the dental arch is flattened anteriorly, forming two angles with the canines, while posteriorly the two halves are inclined lingually.

The alterations produced by rickets on dental development and on the structure of the teeth are most important. The eruption of the teeth is frequently delayed. Steiner noticed the case of the eruption of the first teeth in a child four years old. It sometimes happens that groups of teeth are absent both in the deciduous and permanent sets, while the others are scattered. Frequently there is microdontism and abnormality of form, beside the common hypoplasia. The incisors and more often the canines are pointed. The microscopic alterations of the bones of rickety subjects are characterized by phenomena of reabsorption of the incompleted osseous tissue, owing to lack of lime salts, and for that reason called osteoid. Such a phenomenon appears contemporarily in all bones. Many deny that there is a relation between hypoplasia of the enamel and rickets, but others, as Preiswerk and Sternfeld, admit it.

In the dentine, on the contrary, we find not only the same alterations found in the bone, but also typical phenomena of deficient calcification with large areas of rarefaction, especially toward the apex of roots, which often do not calcify at all.

When the rickets improve, the deposit of lime grows in such a manner as to give the odontosclerosis of Michel, in which the teeth become harder and more compact. And besides the rickets of the first years, we must also remember the rickets of adults or osteomalacia of youth, and the osteomalacia proper, which is a systemic disease of the skeleton. With the aid of the microscope it has been possible to ascertain that also in pregnant women with normal constitution, the bones were affected with a slight degree of rarefaction (physiologic osteomalacia).

And what about the etiology of rickets? It is still unknown. Hereditary syphilis, improper alimentation, heredity, chronic gastrointestinal diseases, artificial feeding, unhygienic housing, foods and water poor in earthy constituents, etc., may be causative factors. But none of these, by itself, may be held as the essential cause of this dyscrasic disease, characterized by deficient fixation of lime salts (absence of fixator bodies), because having examined, at the same time, both the osteoid and the soft tissues, the osteoid was found poor in lime salts while the soft tissues were richer in lime salts than normally.

Now, having seen the relations between rickets and osteomalacia from one side and the dental and facial deformities from the other, we must believe that they are symptoms of the same morbid process, probably originating from altered metabolism of the lime salts, from improper alimentation, and

aggravated by one or more of the causes enumerated above; and as to the type of facial deformity, it is exclusively of hereditary character, i.e., that in the children affected by these disturbances there is a reproduction of a deformity which existed either in one of the parents, or in both, or in the ancestors. Concluding this note, I think that modern orthodontia should not be limited to the more or less knowledge of this or that method of treatment, and to follow this or that technic for moving teeth in the mouth of the children affected by malocclusion, but beside the knowledge of technic which now has been so much perfected by E. Angle, the orthodontist must be profoundly cultured in general and special medicine, otherwise he never will comprehend a facial deformity either from the standpoint of etiology or from that of treatment.

And only in that way we may save our poor young patients from useless and injurious tortures, and step toward the prevention of malocclusions, which must be the principal aim of our studies.

DISCUSSION

The President said the question which had been raised by the author, the relationship between constitutional disease and malocclusions, interested every dental surgeon. Personally he did not quite catch whether Dr. d'Alise meant that the influence of syphilis and tuberculosis on malocclusion was direct or indirect. Many people thought that the influence was direct. Many authors had written with regard to white spots and white lines on the teeth, meaning that the influence of syphilis was directly on the teeth, but another writer who had done a great amount of investigation would not accept that point of view. It seemed to him that it was the chief point in the question. Kranz's opinion was that syphilis and tuberculosis and other constitutional diseases, like rickets, arose from endocrine causes.

Dr. Chiavaro said that in listening to the paper he had been impressed by one thing, and that was the percentage of seven to one in cases of malocclusion. That did not correspond at all with his percentage. He had looked after the mouths of a thousand children between three and six years old and the percentage came out at about 33 per cent. If in 126 the percentage was seven to one it showed that rickets and tuberculosis had special influence upon the malocclusion of the teeth. The author did not seem to think that syphilis and tuberculosis had much to do with malocclusion.

Dr. d'Alise said he certainly did and that it had much to do also with the constitution of the harder tissues of the teeth.

Dr. Chiavaro said that, of course, 126 children were not enough on which to base a settled conclusion, but keeping to the point that malocclusion of children's teeth between three and six years of age was coupled with syphilitic and tuberculous diseases, some conclusion had been reached from which to proceed further and to find out really what was the difference between sound children and diseased children in relation to malocclusion, and thus be able to discover how much those constitutional diseases had an influence on malocclusion.

Mr. J. H. Badcock was afraid the paper contained so much that required careful study at leisure that very few remarks could be made which would be worth making. It was a very valuable contribution to the subject, and he looked forward to reading it with very much profit.

Dr. J. T. Quintero said the paper was certainly very interesting, especially in connection with the bearing of rickets upon malocclusion. The description of the jaws of rickety children given by the author was quite classical and had been often given, but when the author said that rickets could not be reproduced he would point out that no one tried to reproduce it in children, but it might be produced in animals very easily. Professor Mouriquand, of Lyons, had studied the question of nutrition very deeply, particularly the subject of vitamines, and by feeding guinea pigs with certain diets, in which vitamines were deficient, he had produced rickets and he had been able later by feeding them with proper diets, rich

in vitamines, to cure the rickets and the guinea pigs had become perfectly healthy. Therefore, rickets *could* be produced and could be due to malnutrition. He did not say that malnutrition was the only cause, because rickets might be hereditary—children might inherit rickety conditions from their parents although he had not seen any such cases himself. Rickets might also be due to syphilis. Parrot and Marfan were of that opinion. At any rate, it was certainly a general manifestation of the faulty assimilation of lime salts. Syphilis would naturally produce malocclusions, since there were nearly always found maldeveloped teeth and jaws in syphilitic children. What had been said with regard to tuberculosis was interesting, but he himself had been most interested in the question of rickets which could be produced experimentally in animals.

Dr. Hawley thought the paper was an extremely valuable one. The only thing he wished to mention was something in corroboration of what Dr. Quintero had said. Rickets had been recently produced in the Johns Hopkins University by Dr. McCollum and Dr. Grieve. They worked principally with rats. A few months ago he went through their experimental room and saw a large number of rats in which rickets had been produced. They had been also able to cure it. They were making a very extensive study of the effects of rickets upon the teeth as observed in their experiments upon rats. He believed one of the papers they had written had been published in the *Journal of Dental Research*, and they would undoubtedly be publishing other papers very soon.

Dr. de Nevreze remembered a bad case of malocclusion in a girl about thirteen or fourteen years of age. His colleague and he had the family into the office and found out one thing which was very interesting. The father and mother and a daughter were affected by malocclusion, but no malocclusion was noticed in the two first daughters, and they discovered that the third daughter was attacked by bad malocclusion such as was seen in cases of insanity. There was about a centimeter between the maxilla and the mandible. The teeth had big spaces between them. It was found that the father had had syphilis when he was about twenty-one, and was treated very carefully for about six or seven years, during which the two first daughters were born. He took care of himself for six or ten years after that, and the third daughter, who was affected by malocclusion, was born while he was not under treatment. He did not think the syphilis which was treated affected the jaw, because the two first daughters were not affected at all; the third daughter was affected because the father was then having no treatment. He thought that might throw some light on the etiology of malocclusion in relation to syphilis. With regard to tuberculosis, he thought it was necessary to make a distinction between acute tuberculosis and the chronic disease. He did not think a tuberculous person could give malocclusion to a child, but if the child became tuberculous in its childhood, up to about fourteen years of age, it might be possible to have a kind of reflex on the jaws, the maxillary chiefly, but if the child did not get tuberculosis in childhood he did not think malocclusion could occur on account of the history of tuberculosis. It was a matter of heredity, a matter of age, and a matter of the time when the child got the disease. He agreed with Dr. Chiavaro in connection with the percentage of malocclusion from syphilis and tuberculosis more than with Dr. d'Alise. It was only exceptional that the malocclusion from those diseases was more than 10 per cent.

Dr. d'Alise said that for four years he had worked on children of from three to fifteen years of age, whom he had examined every day, because they were in an orphan asylum for war children or children taken from the street. All children were examined medically and periodical tests were taken and tests for tuberculosis. He examined every child that entered the institution, and at the end of two months examined them again to see what change had taken place. He noticed many things. As was well known, syphilis was produced by a microbe, as was tuberculosis. Generally it was believed that a microbe was not sufficient to produce tuberculosis, but that there must be a constitutional disposition to it. Every human being, generally speaking, had in their bodies tuberculous microbes, but some never got the disease. With regard to syphilis in children of the same family, there would be no malocclusion at all and they would be well developed, say, for three children, but the fourth one or the youngest would have rickets, hyperplasia, many teeth missing, and malocclusion, so that in the same family all four might be syphilitic but three were not affected with any

disturbance of the teeth. He came to the conclusion that syphilis and tuberculosis were not the cause, but contributed something which upset the metabolism and brought about a deficiency of lime salts. This was especially so during the last few months of pregnancy and the first years of life. At that time the child obtained all its food from its mother, and, therefore, it was necessary to look to the mother. He remembered that a doctor in London examined over a thousand children in the East End. The food of the Jewish people was rich in fat and children were breast-fed from twelve to eighteen months. The doctor found 80 per cent of rickets in such children. Therefore, some other cause had to be found and he believed that could be found in the metabolism. He did not say that malocclusion came from syphilis or tuberculosis or rickets—he did not know. There was a lack of bodies fixing the lime salts, and, therefore, it was necessary to look to food, especially bread, for some assistance in discovering the cause. Bread was the basis of alimentation, but bread now was deprived of the germ which was rich in lime salt and the fat which was most important. The majority of people believed that the artificial rickets produced in animals were not the same as the rickets found in children, and some believed that the thyroid had some effect on the enamel whilst artificial rickets did not affect the enamel at all. With regard to the percentages mentioned by Dr. Chiavaro, in some cases where he found the Wassermann reaction negative he made a second test. He injected a preparation of mercury or arsenic to stimulate the organism to give the real action, and in some cases after three reactions of the Wassermann test he found the germ in three cases, so that he believed that with the best means at the disposition of the profession today the diagnosis of syphilis could be made. If anyone would come to Naples he would show them the children and the diagnoses and all the tests he had made. The children were divided into five groups, children with syphilis, tuberculosis, sound children, and so on. Certain specialists in syphilis published a paper in which they affirmed that Hutchinson's teeth was very often a certain sign of hereditary syphilis. That was not true. He had seen over 100 cases of hereditary syphilis, and had never seen Hutchinson's teeth, and he had found Hutchinson's teeth in some people who were not affected with hereditary syphilis. In examination some were found to be negative to an examination for syphilis and were discovered to be scrofulous. He had been at a clinic in Vienna and found there some children with hereditary syphilitic teeth and he asked the Professor about the matter, and he said: "I am just doing work on that subject, and very soon I shall place my work before the Academy of Medicine. I believe they are an expression of scrofula and lymphaticism and adenoids." If the question was only studied from the technical side without a good knowledge of the etiology it would never be possible to get to the source.

PRACTICAL APPLICATIONS OF THE SIMPLER FORMS OF ORTHODONTIC APPLIANCES*

By Dr. Fred R. Blumenthal, Boston, Mass.

CASE I. LINGUAL APPLIANCE WITHOUT AUXILIARY ATTACHMENTS

Fig. 1. Front view before treatment.
Fig. 2. Right side before treatment.
Fig. 3. Left side before treatment.

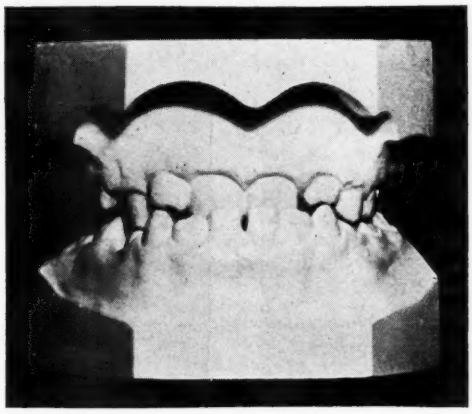


Fig. 1.

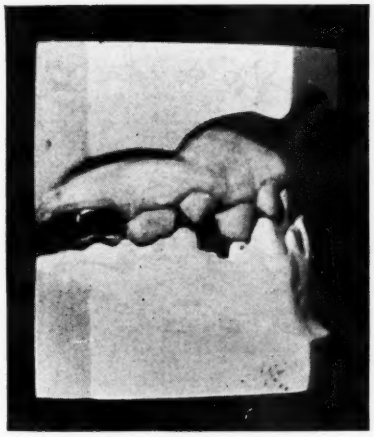


Fig. 2.

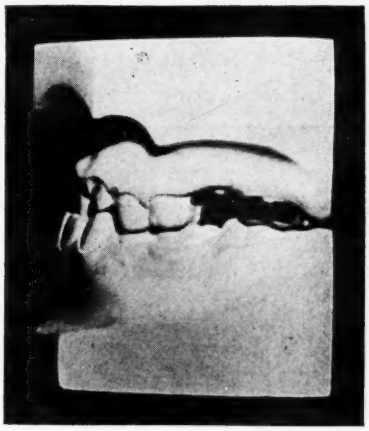


Fig. 3.

Fig. 4. Occlusal view before treatment showing appliance in position. The lock wire on the right maxillary molar is open to show construction.
Fig. 5. Occlusal view after treatment.
Fig. 6. Right side after treatment.

*Clinic given before the American Society of Orthodontists, Kansas City, Mo., March 18-21, 1924.

Fig. 4.

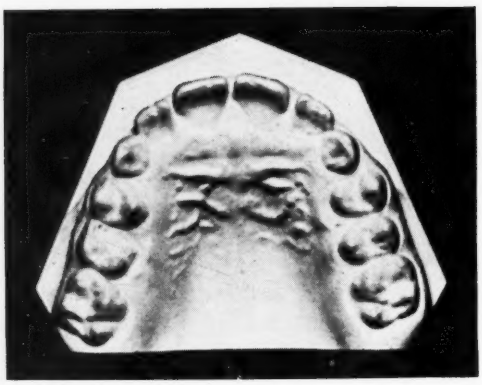
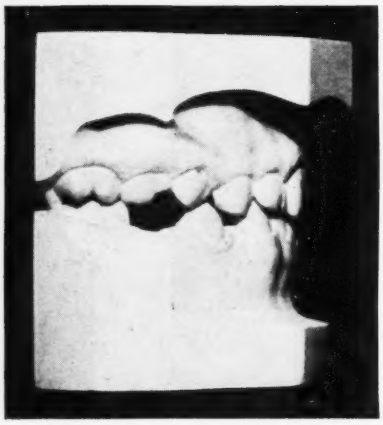


Fig. 5.



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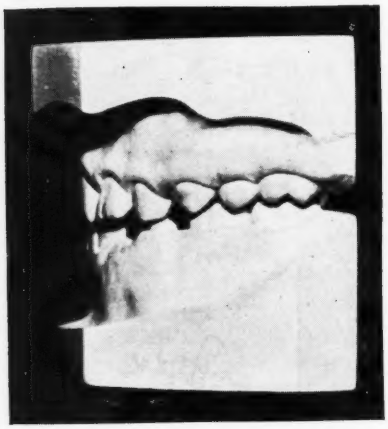

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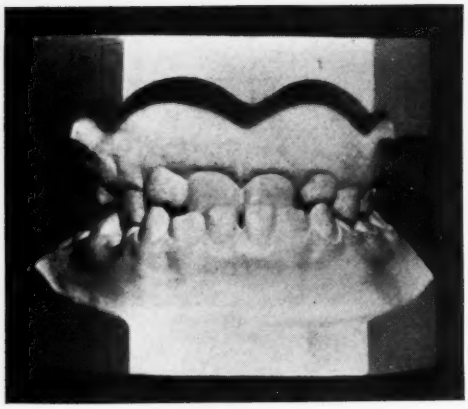


Fig. 8.

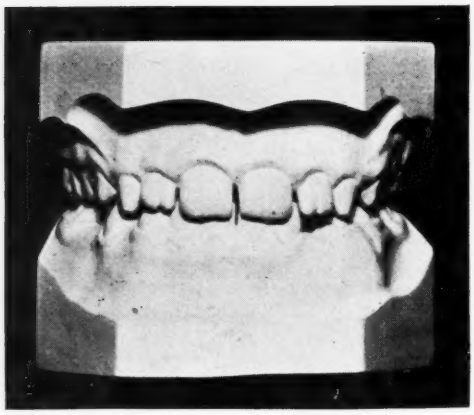


Fig. 8.

Fig. 7. Left side after treatment.
Fig. 8. Front views before and after treatment.

CASE II. LINGUAL APPLIANCE WITH FINGER SPRING ATTACHMENT

Fig. 9. Right side before treatment. Note normal relation. All deciduous teeth.

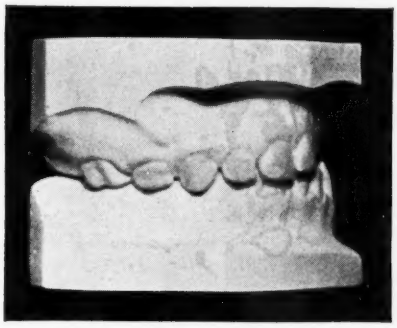


Fig. 9.

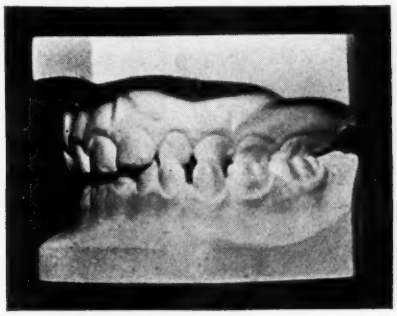


Fig. 10.

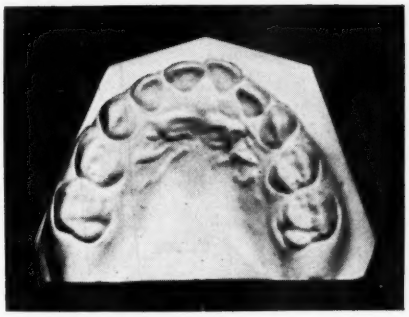
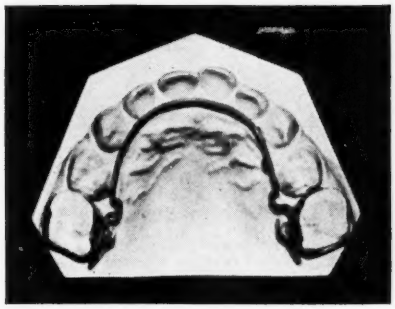


Fig. 11.



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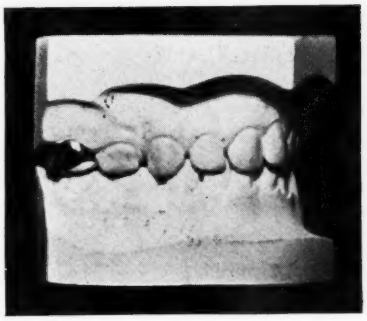

Fig. 13.

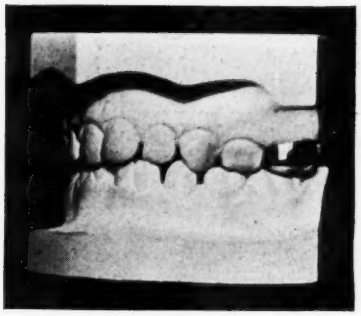

Fig. 14.

Fig. 10. Left side before treatment. Note lingual displacement of maxillary teeth.
Fig. 11. Occlusal view before treatment.
Fig. 12. Occlusal view after treatment showing appliance in position. Note finger spring in contact with left maxillary deciduous canine.
Fig. 13. Right side after treatment, normal as before.
Fig. 14. Left side after treatment.

This case was treated in four months with but two adjustments of the appliance.

CASE III. LINGUAL APPLIANCE USING THE DECIDUOUS CANINES FOR ANCHORAGE

Fig. 15. Front view before treatment. (Note maxillary right lateral incisor.)

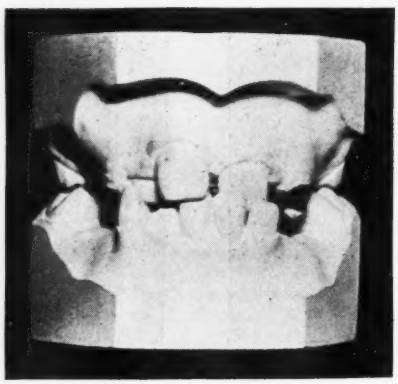

Fig. 15.

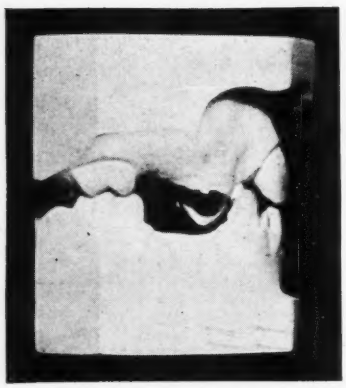

Fig. 16.

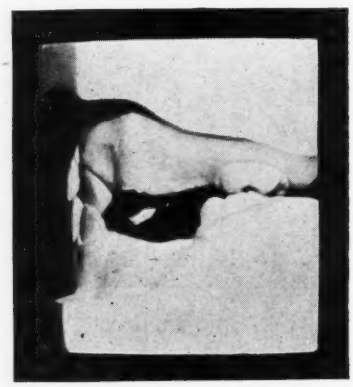

Fig. 17.

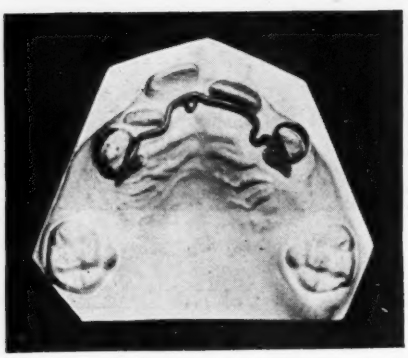

Fig. 18.

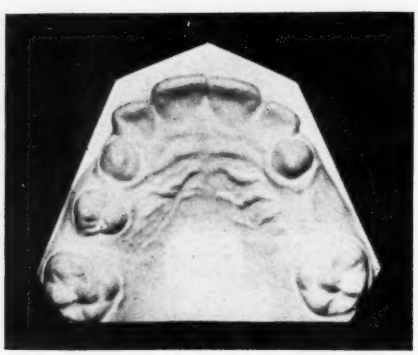

Fig. 19.

Fig. 16. Right side before treatment.

Fig. 17. Left side before treatment. (Note left maxillary lateral incisor has not erupted yet.)

Fig. 18. Occlusal view before treatment showing appliance in position. Note the finger spring against the left maxillary central incisor. This same finger spring was later reversed for the right maxillary lateral incisor.

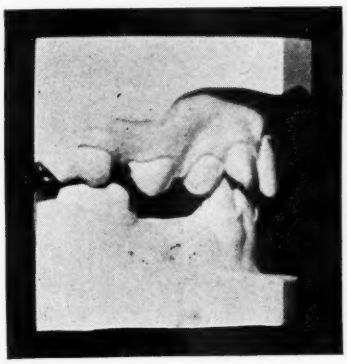

Fig. 20.

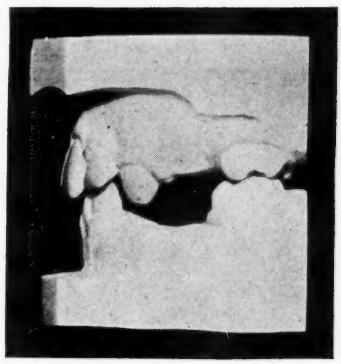

Fig. 21.

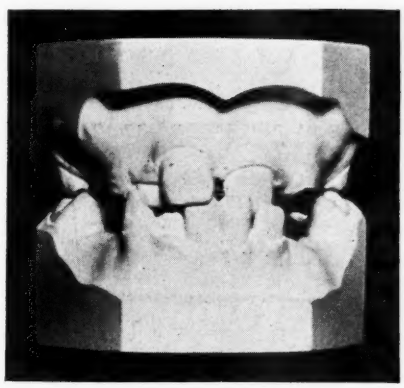

Fig. 22.

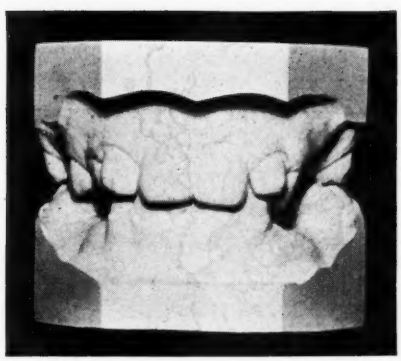

Fig. 22.

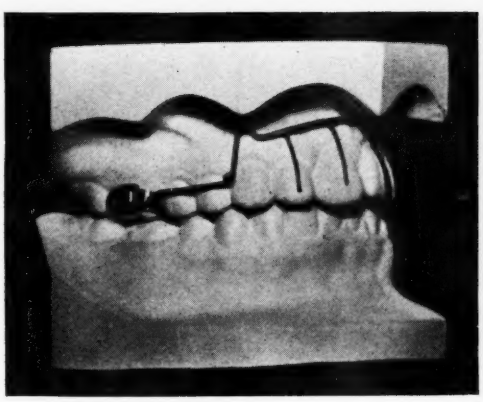

Fig. 23.

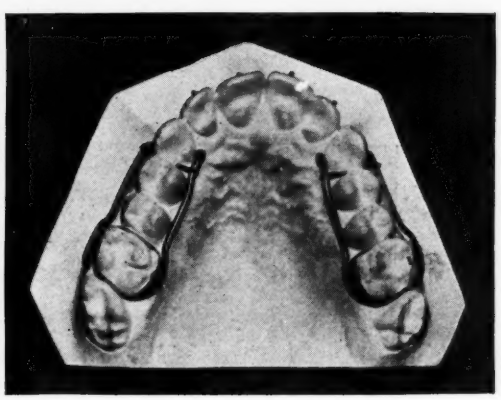

Fig. 24.

Fig. 19. Occlusal view after treatment.
Fig. 20. Right side after treatment.
Fig. 21. Left side after treatment.
Fig. 22. Front views before and after treatment.
This case is not completed.

CASE IV. LOURIE HIGH LABIAL ARCH WITH LINGUAL EXTENSION ARMS

Fig. 23. The Lourie appliance somewhat modified by using a half-round vertical tube and post for the molar band attachment instead of the horizontal round tube. Both attachments have their individual advantages.

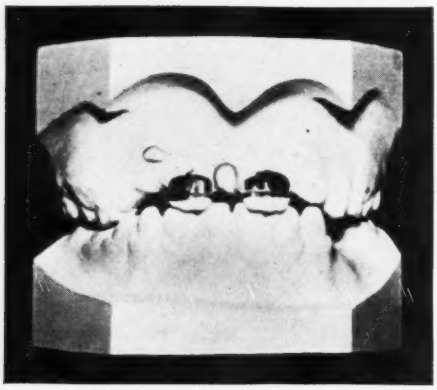

Fig. 25.

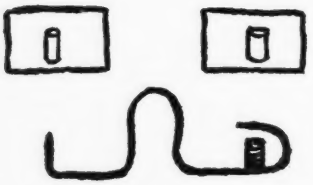

Fig. 26.

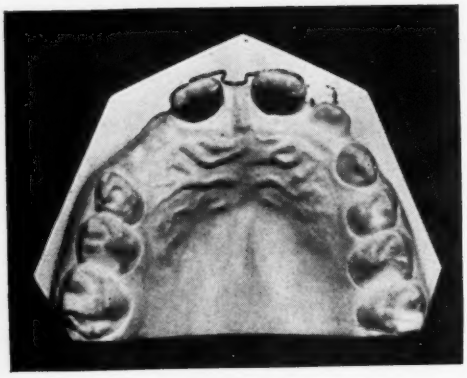

Fig. 27.

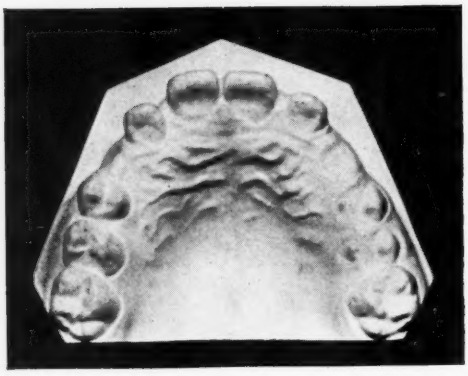

Fig. 28.

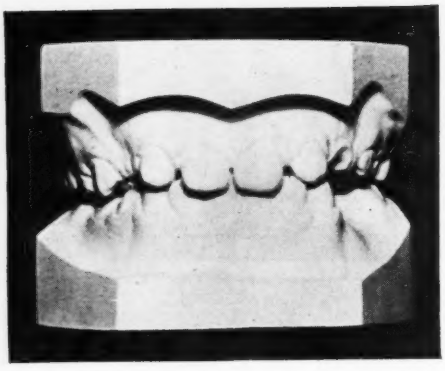

Fig. 29.

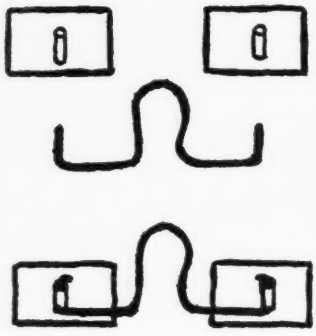

Fig. 30.

Fig. 24. Lingual extension arms which can be ligated if necessary to the labial arch wire.

CASE V. SIMPLE APPLIANCE FOR DRAWING MAXILLARY CENTRAL INCISORS TOGETHER

Fig. 25. Front view before treatment—appliance in position. Note particularly that the left maxillary central incisor is in good vertical alignment while the right maxillary central incisor diverges.

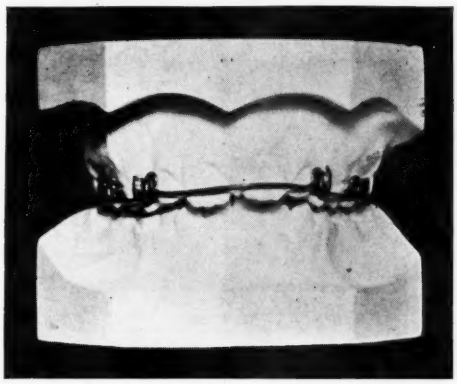

Fig. 31.

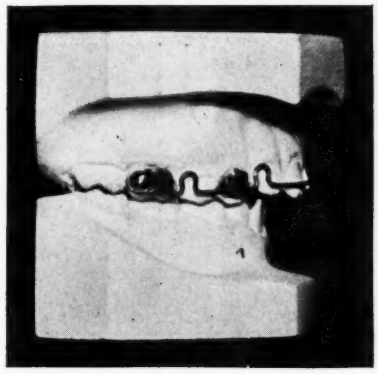

Fig. 32.

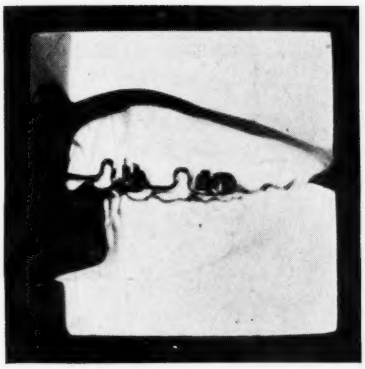

Fig. 33.

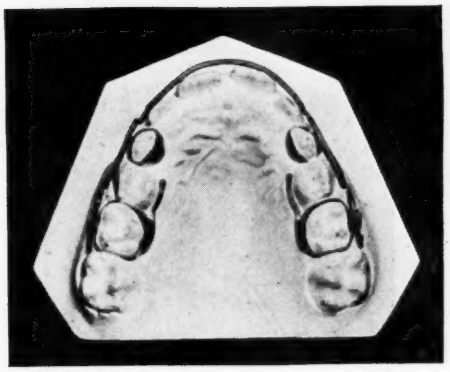

Fig. 34.

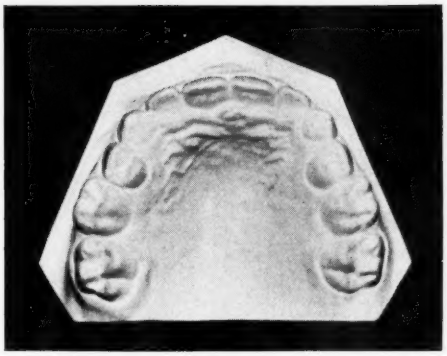

Fig. 35.

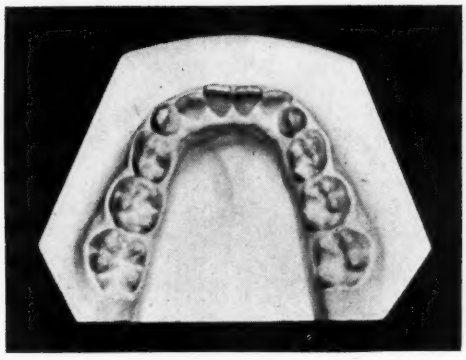

Fig. 36.

Fig. 26. Sketch of appliance. The attachment to the left maxillary incisor band is a half-round tube and post. This gives a firm anchorage. The right maxillary central incisor band has a round tube,—.022 gauge inside diameter which engages the .022 gauge spring wire appliance. This allows simple manipulation for rotation, etc.

Fig. 27. Occlusal view before treatment.

Fig. 28. Occlusal view after treatment.

Fig. 29. Front view after treatment.

Fig. 30. Sketch of appliance often used for drawing maxillary central incisors together. The round tubes on the bands are .022 gauge. The spring

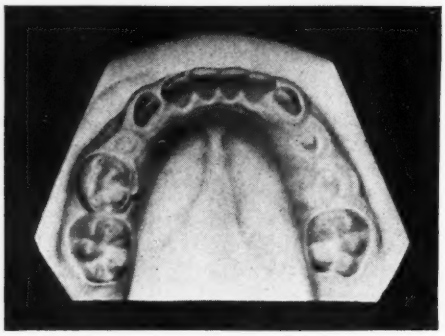

Fig. 37.

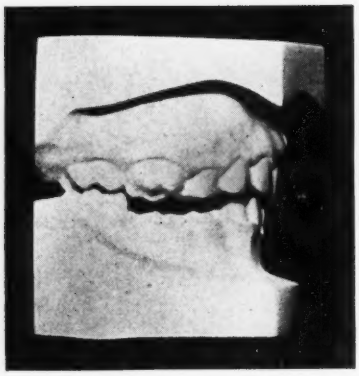

Fig. 38.

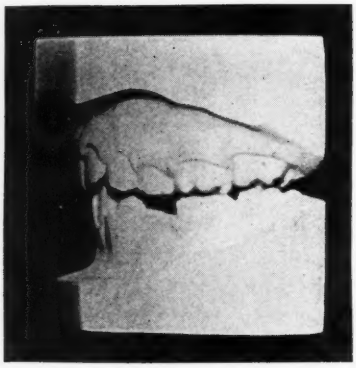

Fig. 39.

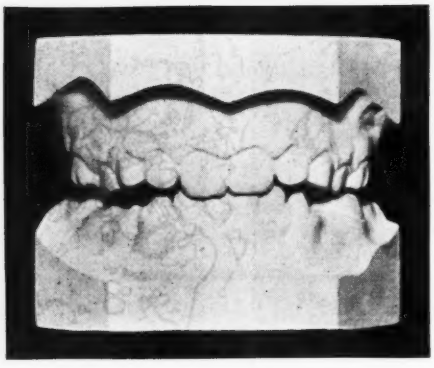

Fig. 40.

wire appliance is .022 gauge. After inserting the spring appliance into the tubes, the ends (which have been softened) are slightly bent to hold the appliance in place. This appliance is very practical for frenum cases as it is very simple and clean and can be used as the retaining appliance.

CASE VI. JUNIOR PIN AND TUBE APPLIANCE

Fig. 31. Front view before treatment.

Fig. 32. Right side before treatment. (Appliance is used on deciduous teeth.)

Fig. 33. Left side before treatment.

Fig. 34. Occlusal view before treatment.

Fig. 35. Occlusal view after treatment.

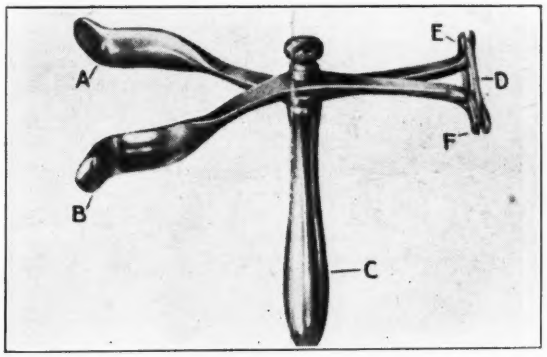

Fig. 41.

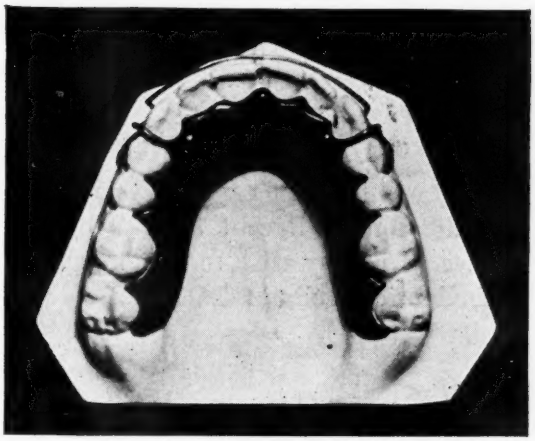

Fig. 42.

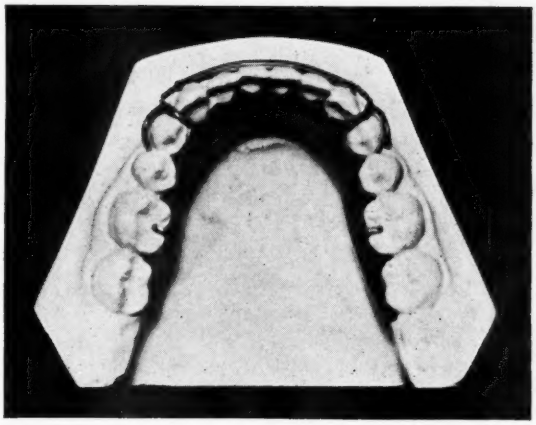

Fig. 43.

Fig. 36. Occlusal view mandibular before treatment. (Treated with lingual appliance.)

Fig. 37. Occlusal view mandibular after treatment.

Fig. 38. Right side after treatment.

Fig. 39. Left side after treatment.

Fig. 40. Front view after treatment.

This case is not completed.

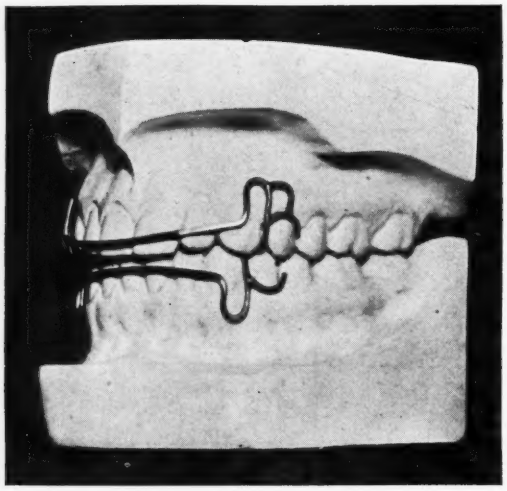

Fig. 44.

THE ROGERS MUSCLE EXERCISER

Fig. 41. This exerciser is becoming widely known and used amongst the orthodontists all over the world. Recent articles by Dr. Alfred P. Rogers thoroughly explain its use. I merely wish to include this as one of the simpler forms of practical orthodontic appliances.

CASE VII. THE HAWLEY REMOVABLE RETAINERS

Fig. 42. Lingual view maxillary.

Fig. 43. Lingual view mandibular.

Fig. 44. Labial view.

CLEFT PALATE CASES*

Orthodontic Treatment

By William Ovey, L.D.S.Eng.

Case G.—Vera H., aged seventeen. Cleft palate and harelip. Operation in infancy at Great Ormond Street by Sir Wm. Lane. Has received orthophonic instruction.

Orthodontic Treatment.—(*a*) Expansion by divided expansion arch, applied lingually, followed by Blue Island H.S. arch.

*Transactions of the British Society for the Study of Orthodontics.

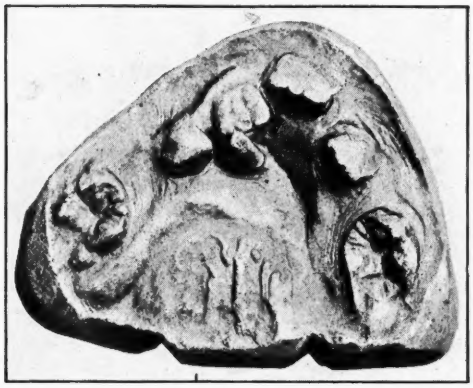

Fig. 1.—Case G. Complete cleft. Flap operation.

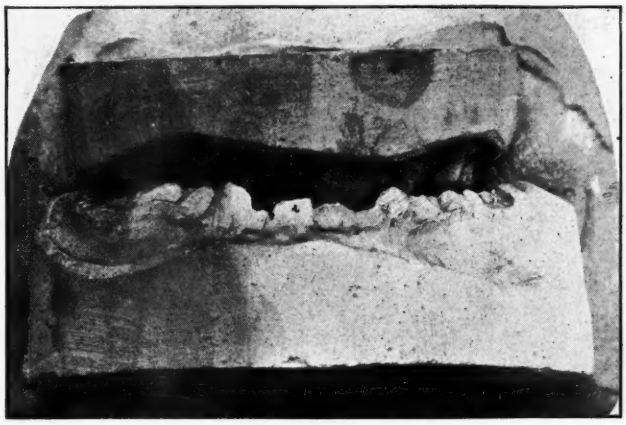

Fig. 2.—Case G. Shows the lack of occlusion.

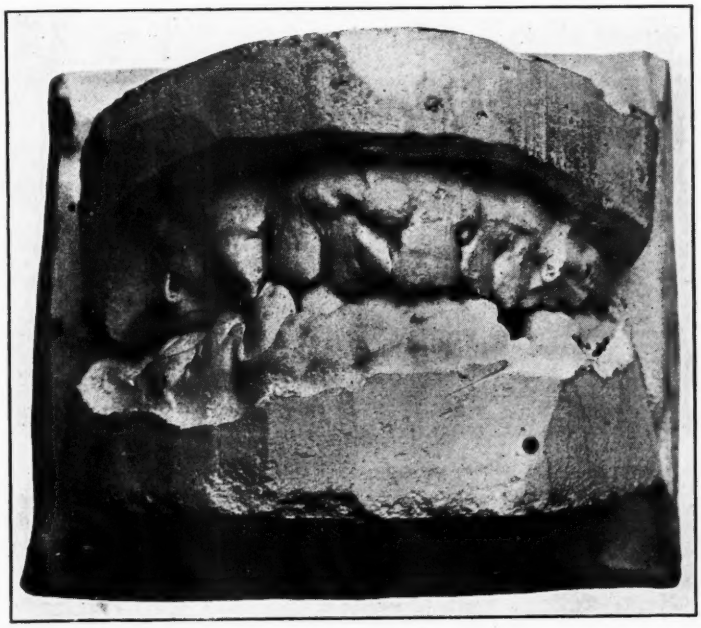

Fig. 3.—Case G. Result of treatment.

(*b*) The mandibular second premolars were extracted before eruption in 1916.

(*c*) Vulcanite retention plate with vulcanite peg to complete movement of $\underline{2|2}$.

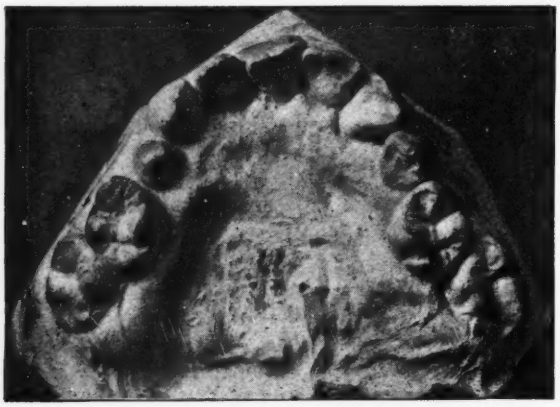

Fig. 4.—Case G. Result of treatment.

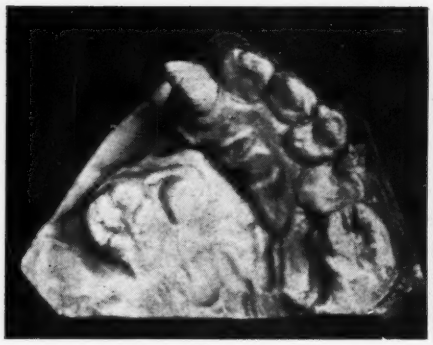

Fig. 5.—Case H.

Fig. 6.—Case L.

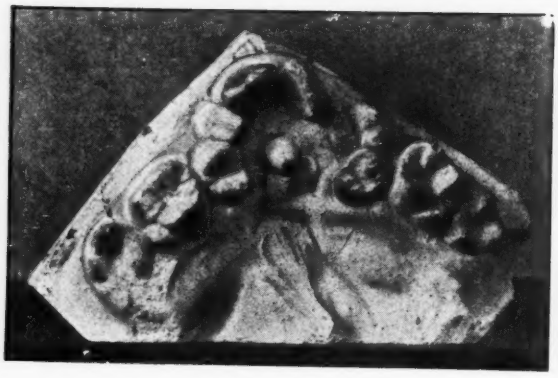

Fig. 7.—Case M. Complete cleft. Flap operation.

Fig. 8.—Case M. Showing Condition of occlusion.

(*d*) Plain vulcanite retention plate worn two or three hours a day to prevent relapse.

CASE H.—Albert H., aged twelve. Unilateral cleft, harelip. Operations at twelve days, 18 months, and 2 years, 10 months, by Sir Wm. Lane.

Exhibited to show torsion of central incisor, which is a common accompaniment of harelip.

Orthodontic Treatment.—Ribbon arch to be followed by denture when retention is complete.

CASE K. *(not illustrated).*—Terence C., aged ten. Cleft palate and harelip. Operations by Mr. Hughes at Guy's Hospital. Palate at three months, lip at six months.

Treatment by means of ribbon arch recently commenced. This case shows the particular value of the ribbon arch in treating these cases. (Shortening of the arch is sometimes necessary.)

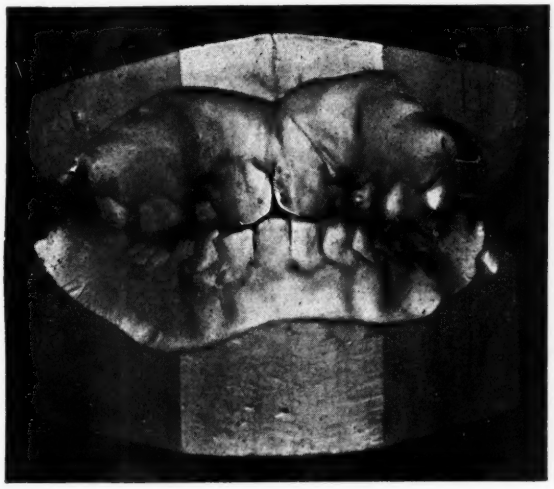

Fig. 9.—Case M. Showing result of treatment.

The patient also exhibits the habit of attempting to speak with the tongue lolling in the floor of the mouth, which is common in cases that have not received orthophonic instruction.

CASE L.—Gwendolin O., aged seven and one-half. Double harelip and complete bilateral cleft of central portion of premaxilla. Operations at Great Ormond Street by Mr. Tyrrell Gray at ten months and two years. Expansion between $\underline{B \mid B}$ has been obtained by a vulcanite plate with finger springs.

CASE M.—Irene L., aged eleven. Flap operation at Guy's Hospital by Sir Wm. Lane. Under orthophonic instruction.

Orthodontic Treatment.—Expansion by means of ribbon arch (still in progress).

Most of the illustrations in the foregoing paper have been reproduced by courtesy of the *British Dental Journal.*

CLEFT PALATE CASES*

Orthophonic Treatment

By Miss Elsie Nicholl, A.R.A.M.

Case A.—John E., aged five. Good palate after operation. Consonants very feeble, and unable to say *S* and *K*. Speech very indistinct. After thirteen lessons able to pronounce every sound distinctly. Sometimes confuses words or leaves out a consonant due to carelessness, as he speaks quite plainly when he thinks about it.

Case B.—Grace B., aged four. Palate not very good. Unable to say *T, D, S, K, G, B.* Voice very weak. After fifteen lessons able to say all consonants, though some are still rather weak, such as *S, Sh*. Voice clearer, and her deaf mother is now able to hear her speak.

Case C.—Laurie T., aged four. Good palate after operation, but very high. Rather deaf; speech quite indistinct; voice very dull and weak; could not say *S, K, G, T, D*. Twenty-six lessons; can say all consonants and vowels. Voice still rather dull, but it is steadily improving.

Case D.—Nellie A., aged seven. Bad palate. Unable to say *P, B, S, Sh, K, G*. Very dull weak voice; vowels indistinct. Twenty-six lessons. Able to make all consonants and vowels, though *S, Sh* are still weak owing to the bad cleft palate. Voice much clearer and tone stronger, but still requires further development.

Case E.—Roland H., aged ten and one-half. Five lessons. Bad cleft palate, double harelip, center of lip joined to gum and very stiff. Obturator inserted by Mr. Pitts. Was unable to make any consonants clearly, some not at all. Voice very dull in quality, vowel sounds indistinct. Upper lip much looser, consequently the two scars show less. Able to get *S, Sh* faintly; other consonants all getting stronger. Voice much clearer but has difficulty in going smoothly from consonant to vowel; speaks in jerks.

Case F.—Donald B., aged four. Sixteen lessons. Very bad cleft palate, and harelip very tight. Obturator inserted by Mr. Pitts, which he is able to keep up except when saying *P;* but as he had great difficulty in keeping it up at first with other sounds, he may be able to manage it eventually with *P*. All consonants and vowels were bad, and he was quite unintelligible when he began at the clinic. Able to keep obturator up in all sounds now. *S, Sh* very good and all other consonants quite fair. Voice tone improving very much; *E* and *Oo* getting clearer; these were quite indistinct. Some words perfect.

*Transactions of the British Society for the Study of Orthodontics.

DEPARTMENT OF

ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

A SYSTEMATIZED TECHNIC FOR THE REMOVAL OF IMPACTED MAXILLARY CANINES

By Leo Winter, D.D.S., New York City

Clinical Professor of Oral Surgery and Diseases of the Mouth, New York University College of Dentistry.

(Continued from June)

SINGLE IMPACTION—EDENTULOUS MOUTH. EVIDENCE BY DIGITAL PALPATION OF THE POSITION OF THE CROWN PALATALLY

(Classification No. 4.)

MAKE an incision directly on the ridge extending from the premolar area to the premolar area of the opposite side. (Fig. 49.) The incision should be made down to the bone. (Fig. 50.) Then the soft structures are separated from the bone by a broad periosteal elevator. (Fig. 51.) The flap is then either held posteriorly or a suture of catgut or horsehair is passed through it and the flap and held aside. In these cases, the bone covering the crowns of the impacted teeth is usually very thin and permits of its removal without much resistance. Mastoid gauges, flat chisels or round bone burs may be used. After exposing a little more than the crown of the tooth, an attempt may be made to grasp the crown with a pair of thin beaked forceps for maxillary teeth, or the tooth can be raised by the use of an elevator. (Fig. 52.) Following the removal of the tooth, all sharp and roughened surfaces should be made smooth, the wound irrigated and sutured. (Figs. 53, 54.) In separating the mucoperiosteal flap from the bone it is necessary to sever the anterior palatine vessels to overcome any resistance.

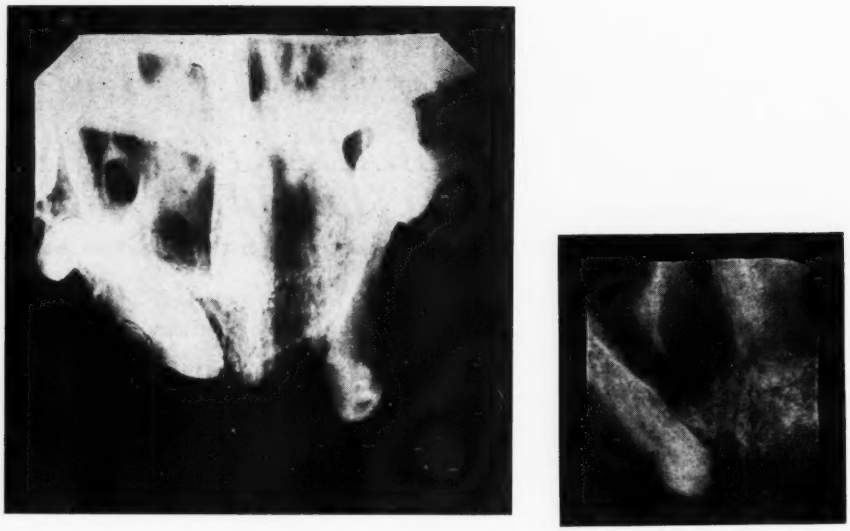

Fig. 49.—Comparison of the two types of radiograms of an impacted canine which upon digital palpation, gave evidence of its position palatally.

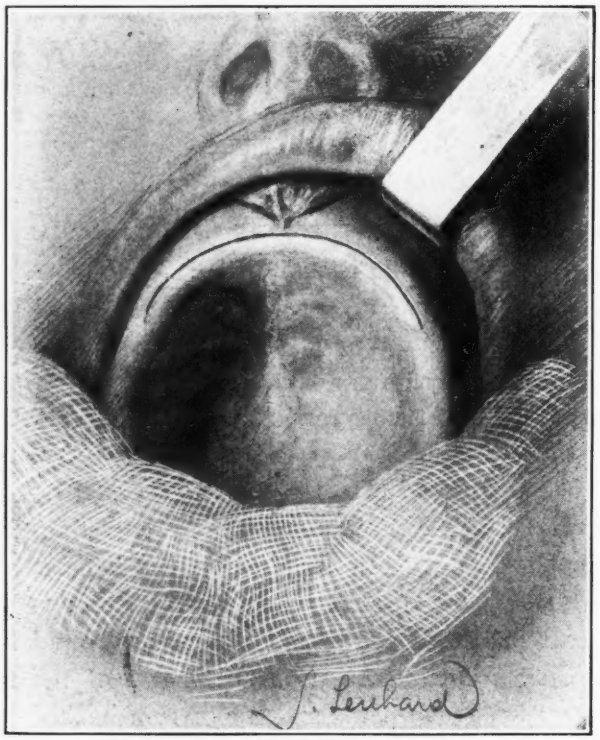

Fig. 50.—Nature of incision used in unilateral or bilateral impactions in edentulous mouths, where the palatal route is decided upon. Incision is made directly on the ridge, cutting down to the bone, extending from premolar to premolar area.

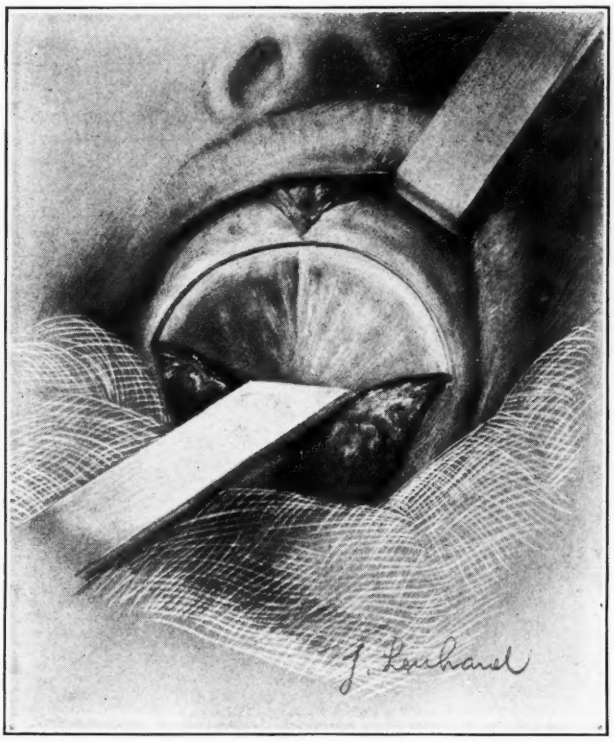

Fig. 51.—Showing the separation of the mucoperiosteal flap from the bone.

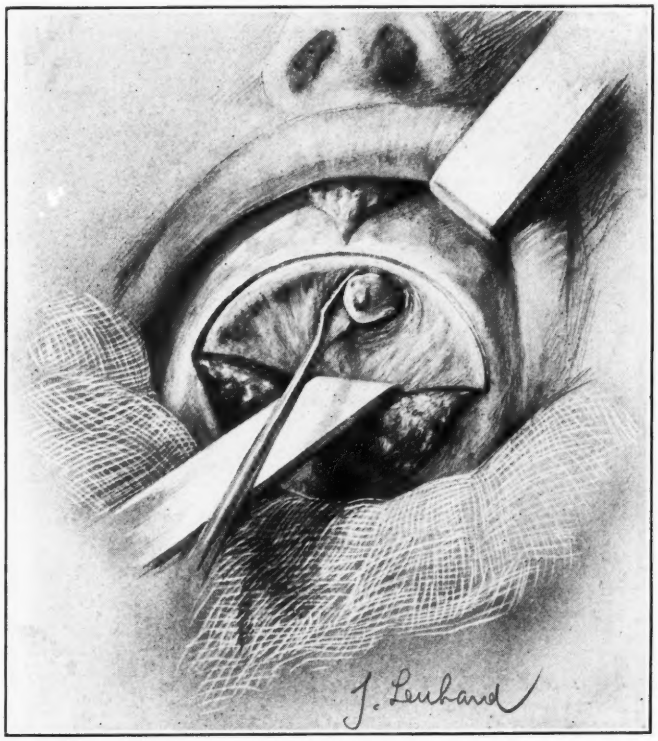

Fig. 52.—Showing the elevation of the crown of the impacted tooth, after the overlying bone had been removed. The force exerted by the elevator should be toward the palate, and not toward the ridge.

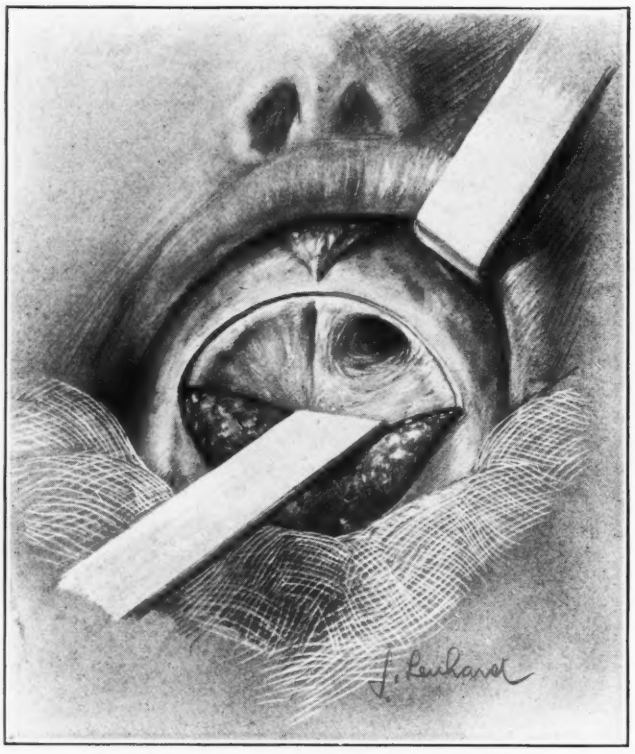

Fig. 53.—Tooth removed, with ridge intact.

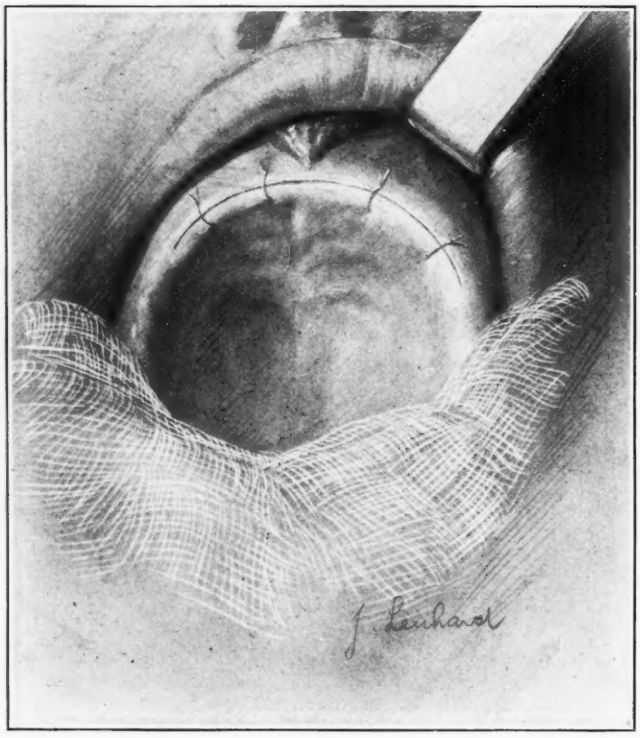

Fig. 54.—Showing wound sutured. Care should be taken in approximating the lips of the wound prior to suturing, to have them turned outward.

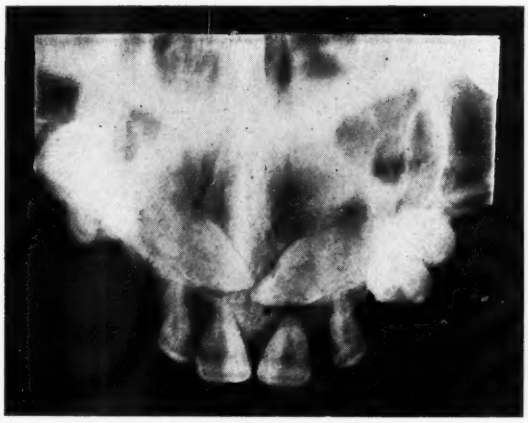

Fig. 55.

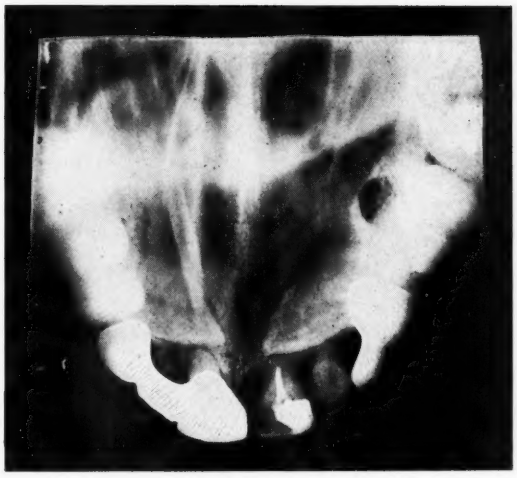

Fig. 56.

Fig. 57.

Fig. 58.

Fig. 59.

Figs. 55 to 59.—Bilateral impacted canines, showing varying degrees of divergence of the coronal portion.

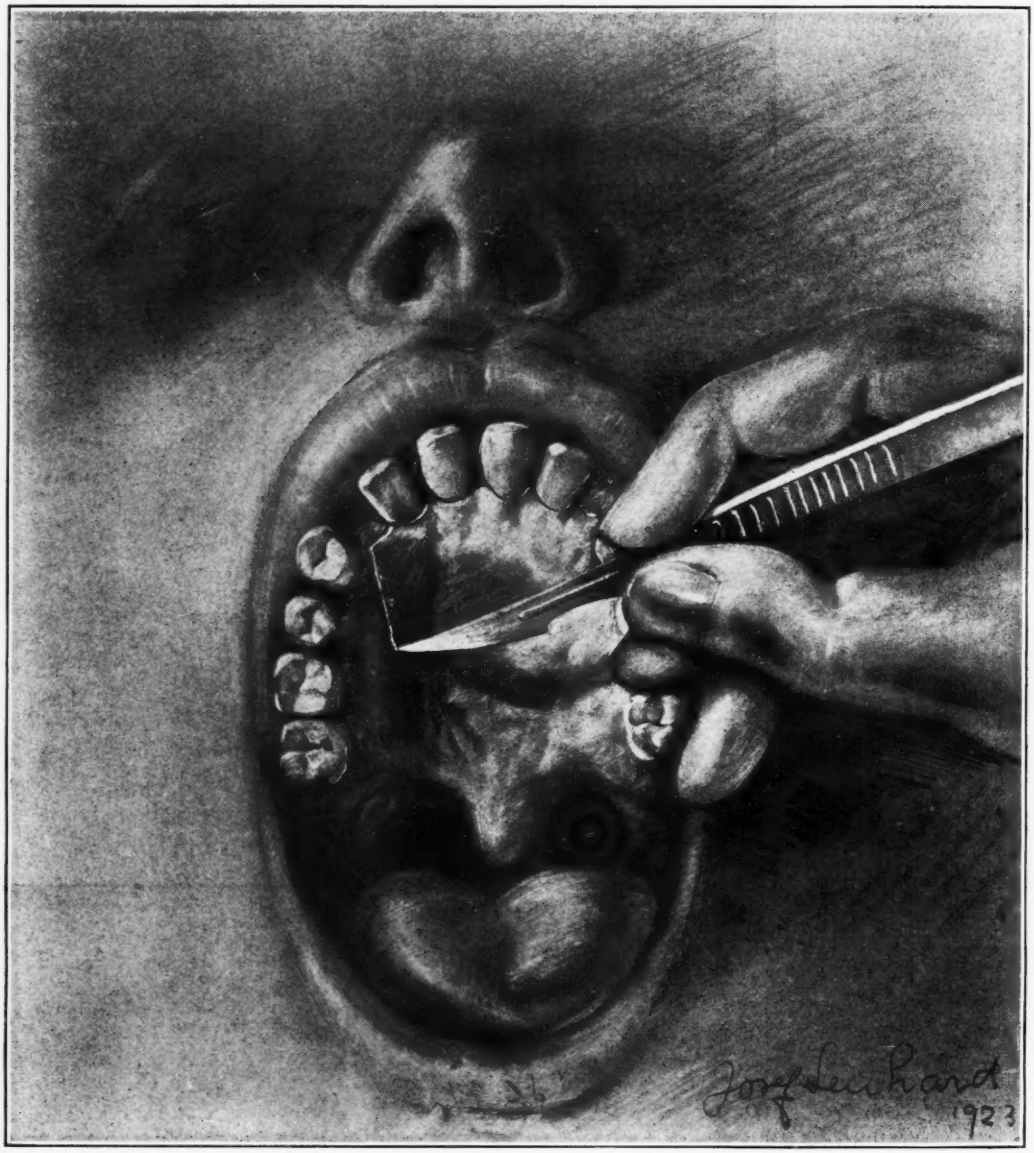

Fig. 60.—Incision for bilateral impaction. Teeth in arch. Crowns of the impacted teeth almost in opposition.

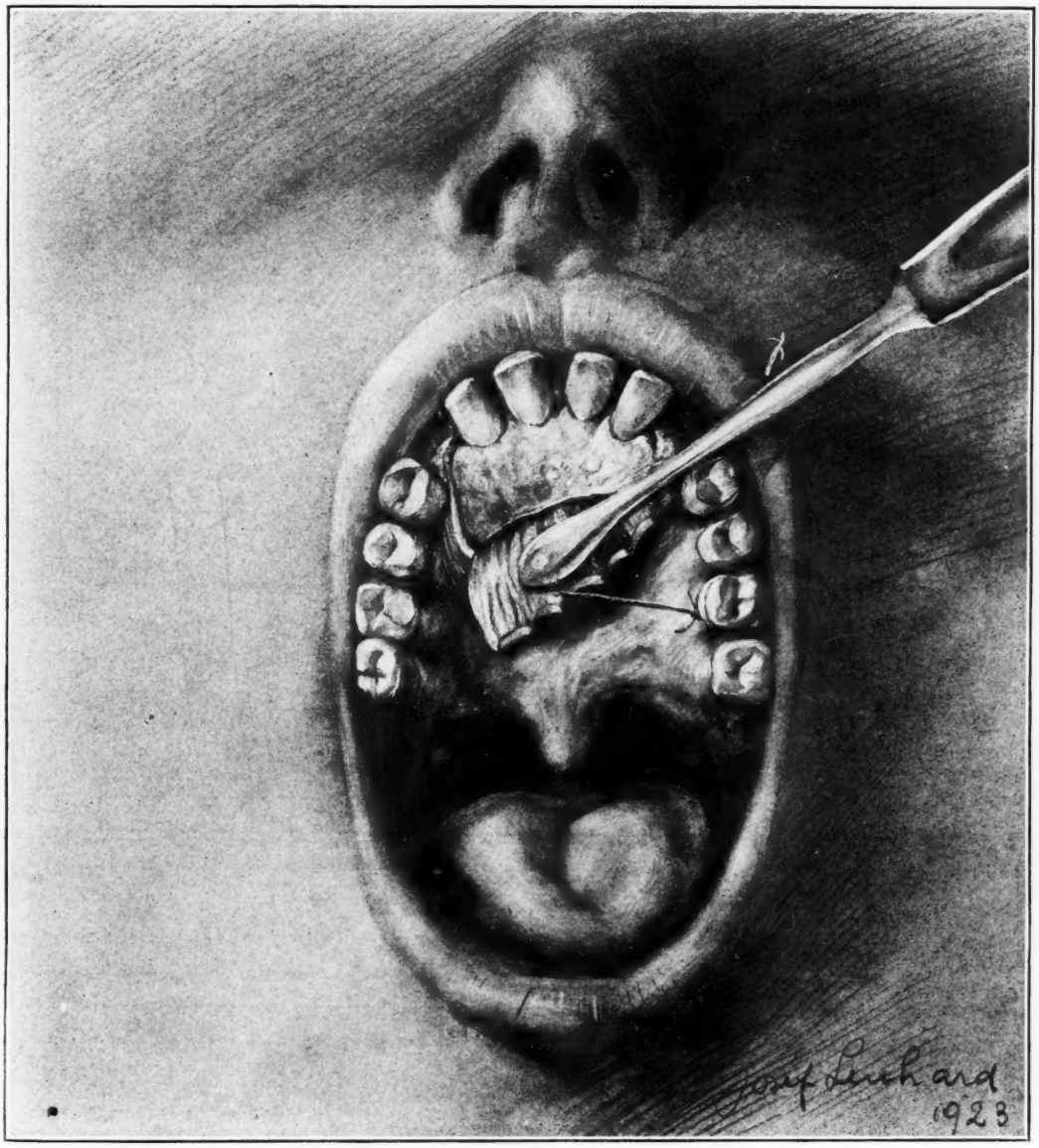

Fig. 61.—Elevation of the mucoperiosteal flap.

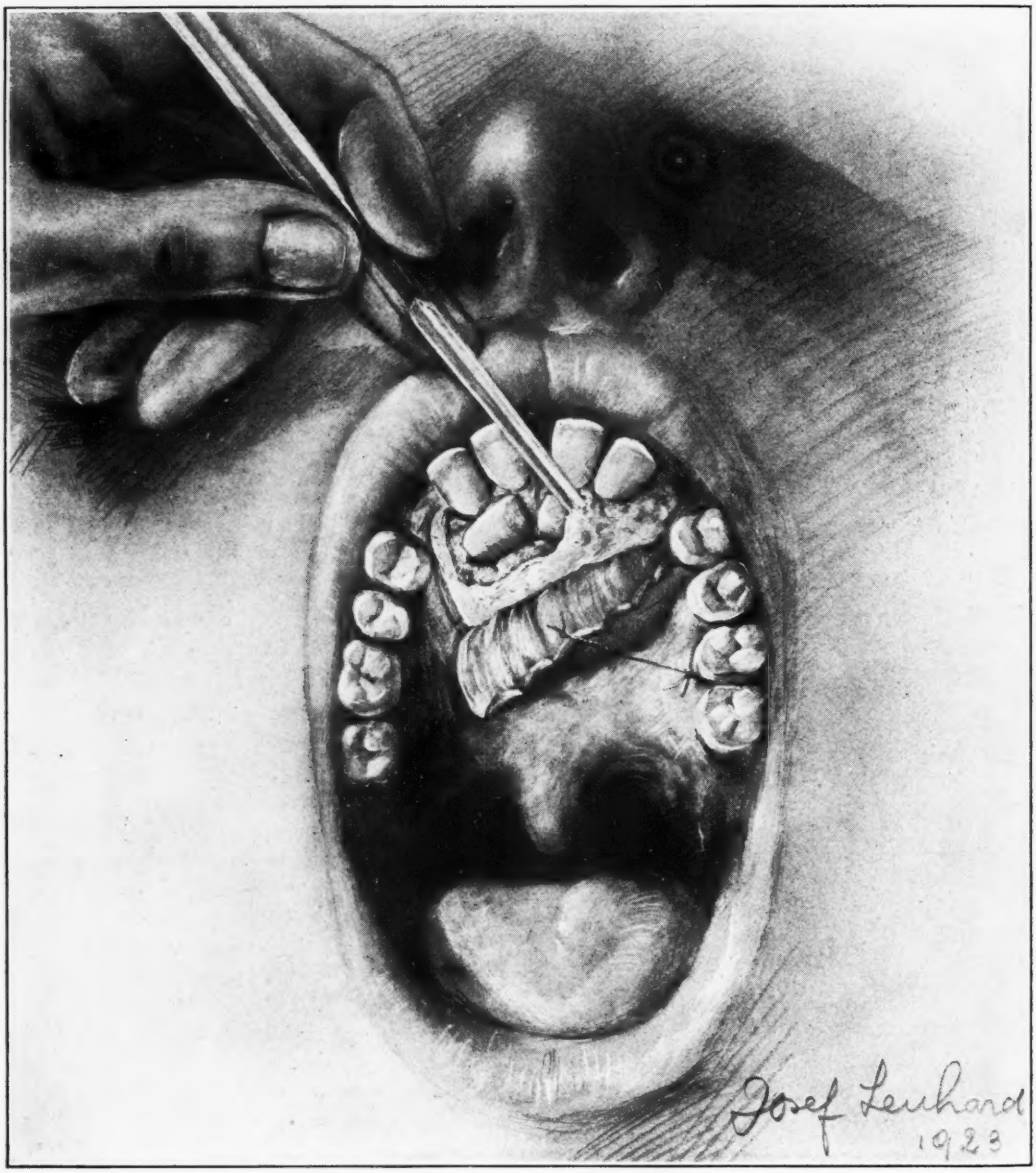

Fig. 62.—Showing position of the mastoid gauges, used in removing the overlying bone.

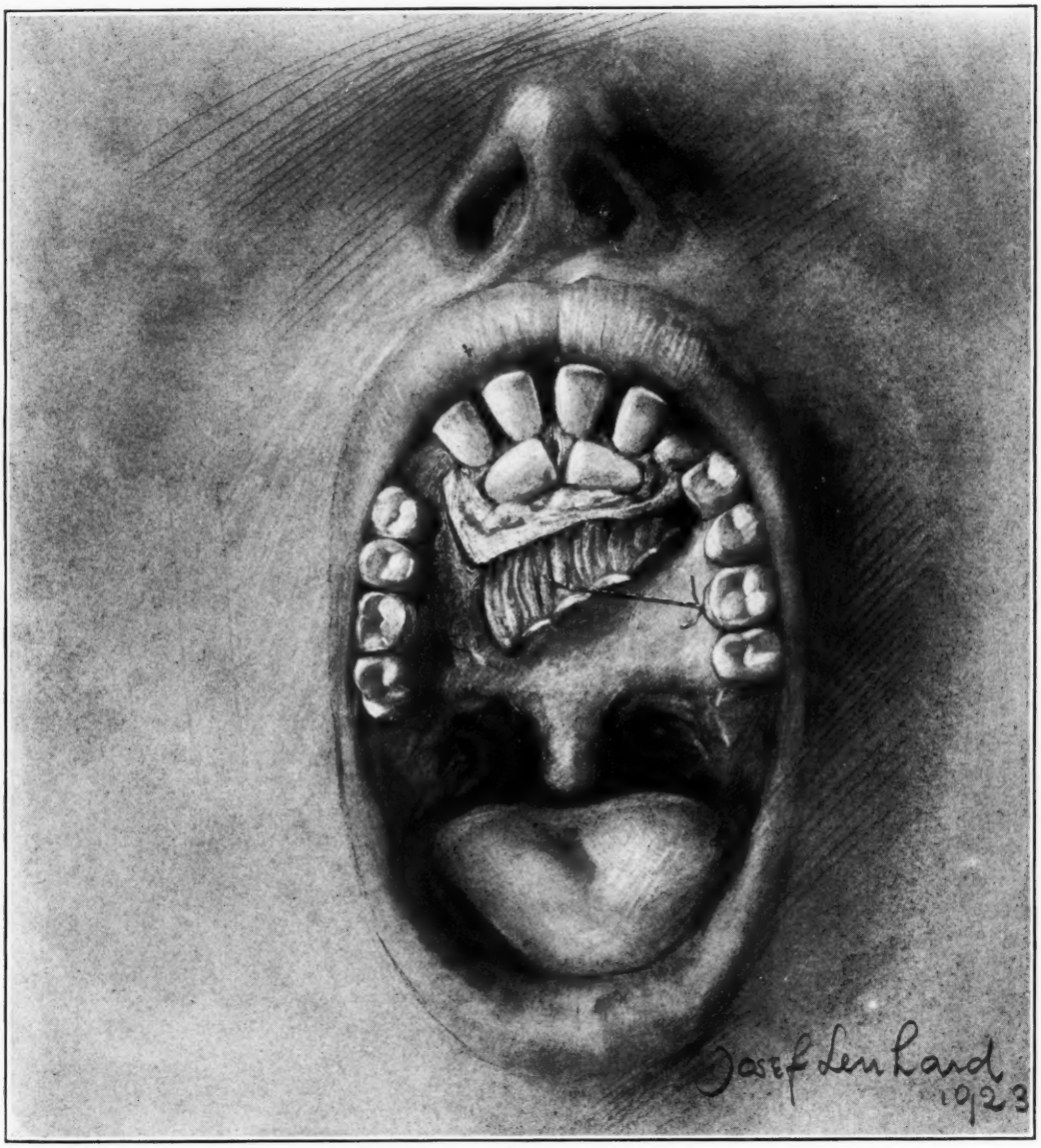

Fig. 63.—Showing sufficient portion of teeth exposed to permit of their removal.

BILATERAL IMPACTION—TEETH IN ARCH

(Classification No. 5)

The incision involving the gingival margins of the teeth, as described, for the single impacted canine lying close to the gingival margin should be made in these cases. This technic is advocated for cases of bilateral impac-

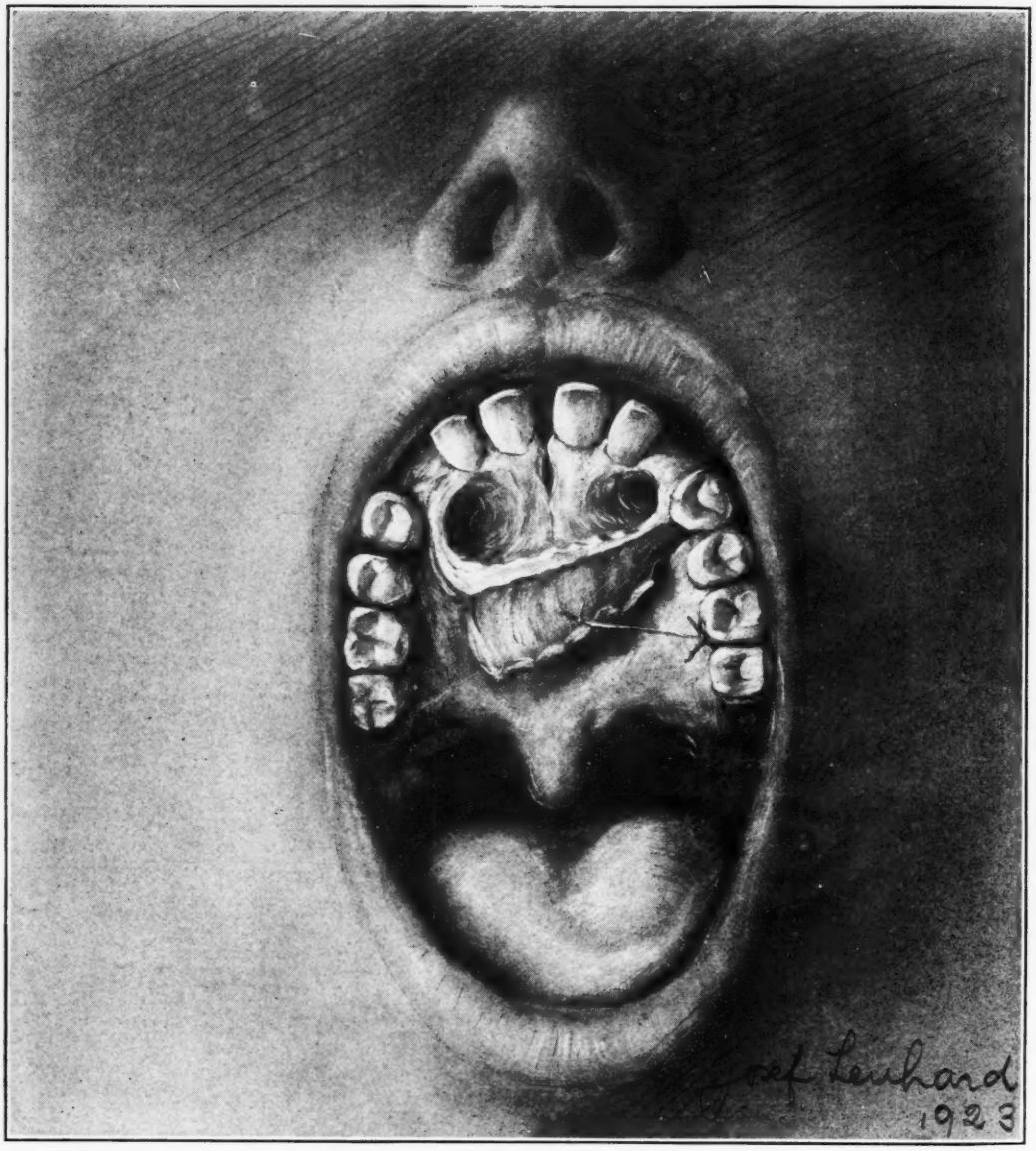

Fig. 64.—Teeth removed. The illustration shows that by using a single incision for bilateral impacted canines, we are enabled, because of the excellent view of the field of operation, to conserve a bridge of bone in the median line. Through the conservation of this bridge of bone, we have a support for the flap, and the absence of a depression in the anterior portion of the palate.

tions irrespective of the distance of the coronal portion of the teeth in relationship to the gingival margin. (Figs. 55 to 59.)

The two-stage operation for the removal of bilateral impacted canines should be discouraged. The operation is best accomplished in one sitting and

with a single incision. In some cases it becomes necessary to modify an incision, extending it distally to the canine or premolar, depending upon the divergence of the crowns of the impacted teeth. (Fig. 60.) By the use of the

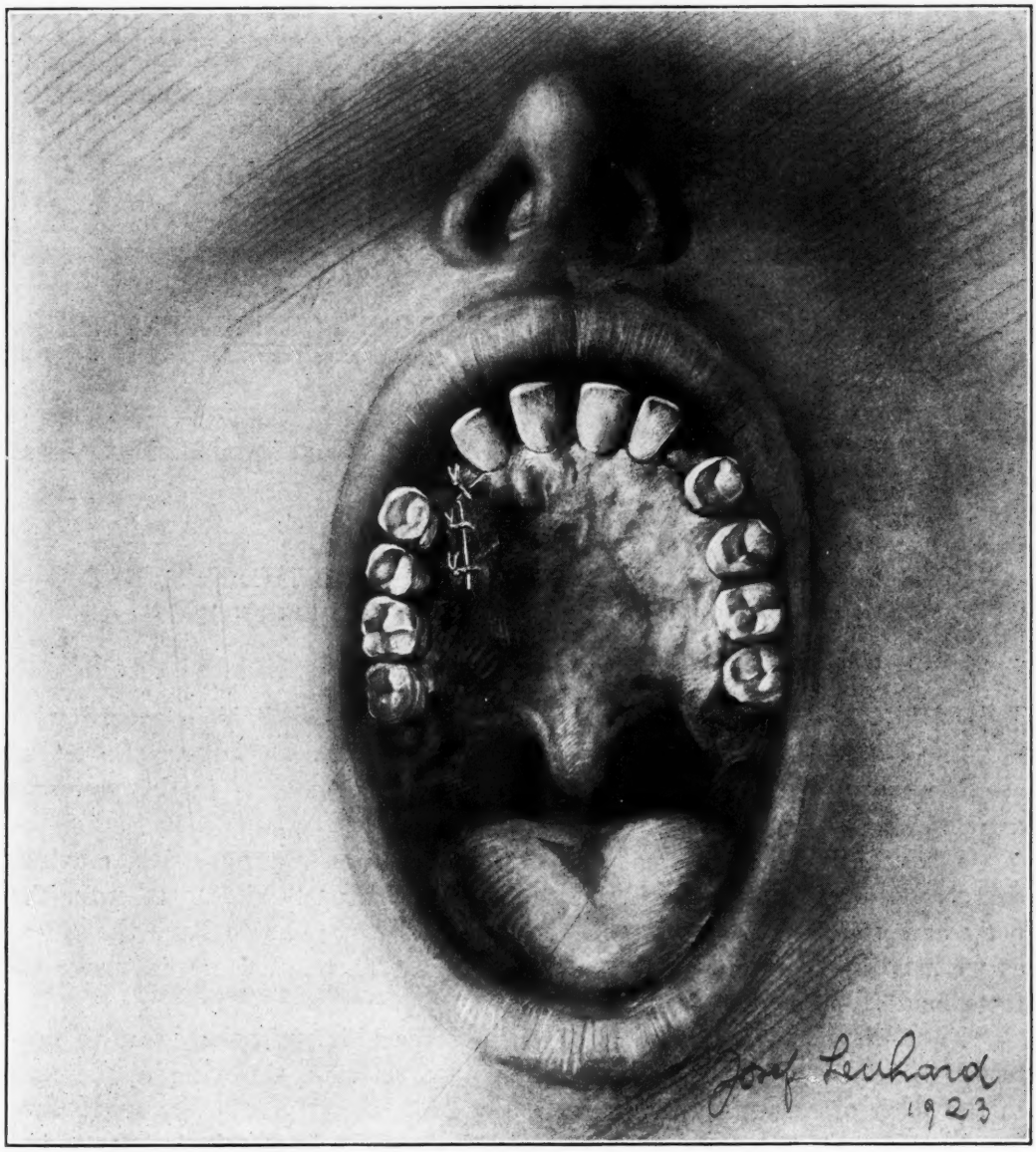

Fig. 65.—Showing method of using sutures, in cases where this particular incision is made, and one or more teeth are absent.

single incision, we are enabled in those cases where the crowns of the teeth are not in opposition, to conserve a bridge of bone in the median line, thereby eliminating any depression in the palate. (Figs. 61, 62, 64, 65.)

(To be continued.)

DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., F.A.C.D.,
and Howard R. Raper, D.D.S., F.A.C.D.

A NEW KIND OF X-RAY EXAMINATION FOR PREVENTIVE DENTISTRY*

By Howard R. Raper, D.D.S., F.A.C.D., Albuquerque, N. Mex.

(Continued from June issue.)

NOTES ABOUT PREVENTIVE DENTISTRY AND THE NEW RADIOGRAPHIC INTERPROXIMAL EXAMINATION

Nature's Attitude

NO PROPOSED treatment of disease is sound unless it is in accord with the actions and reactions and apparent opinions of Nature. So let us see, if we can, what Nature thinks about the ideas set forth in this series of articles.

I have asked my reader to think of disease as a progressive, moving, destructive process, starting in the tooth and apparently aiming to enter the body and attack the vital organs thereof. Nature seems to have that idea, as we may judge from the defenses she offers. Three of these defensive efforts may be illustrated radiographically.

First there is the secondary dentin defense (Fig. 38), the effort to protect the pulp. When decay occurs, the pulp retreats, throwing up defense in the form of secondary dentin as it does so.

If this first effort at defense fails and the pulp is attacked, Nature immediately sends in a terrific alarm, in the form of the most exquisite pain, toothache. To judge from the vigor of the alarm, it is Nature's opinion that something of considerable importance has happened. And so it has: Disease has reached the circulation!

Nature's second defense is in the form of osteoid tissue in the apical foramina and hypercementosis (Fig. 39) over the root end. (Hypercementosis is very much more common on pulpless teeth.) This is apparently an effort to confine the disease to the tooth, to keep it from going out through the tooth into the bone.

If the second defense fails, and the disease penetrates beyond the end of the root, Nature's first effort seems to be to exfoliate the tooth. (Consider the symptoms of an acute abscess in which the tooth gets very loose.) Failing in this, she resorts again to mechanical barriers to prevent the march inward of the enemy, disease. She builds a fibrous protective wall, the pyogenic membrane, and, not only that, but often, also, a wall of dense sclerotic bone (see Fig. 40).

Seeing with what determined persistence Nature fights the progress of the advancing disease and noting that, though she fights she usually loses,

Fig. 38.—Nature's first defense: secondary dentine. Notice how the pulp, in the lateral, has receded from the encroaching carious cavity. Compare the pulp chamber outline in the lateral to that in the central incisor to estimate the amount of recession.

Fig. 39.

Fig. 40.

Fig. 39.—Nature's second defense: hypercementosis (the crowned second premolar) which may be looked upon as an effort to keep disease from penetrating the apex and extending into the bone. A light tracing indicates the outline of the root of the second premolar before the excementosis occurred.

Fig. 40.—Nature's third defense: a wall of dense bone, about the area of infection and bone degeneration. Still another effort to stop the progress of disease and infection, to keep it from spreading to other parts of the body.

does it not seem the wisest course to go to her assistance just as soon as possible?

If dentists and patients will co-operate with Nature in her first defense (the formation of secondary dentine) by the filling of cavities before they have a chance to involve the pulp, the progress of the encroaching disease may be stopped as surely and definitely as the turning of a switch turns off an electric light. But let the enemy once gain the foothold of reaching the circulation, that is to say, let toothache occur, and we are immediately confronted with a different and vastly more difficult problem.

Our best men disagree continually as to just which pulpless teeth should be extracted and which may remain in the mouth with safety to health. The reason for this is not far to seek: There is no *exact method* of *proving* that any given pulpless tooth is harmless to the organism carrying it.

It is pretty generally conceded that a tooth showing periapical bone destruction is a menace to health. But, to speak rather obviously, that only goes as far as it goes. Teeth which do *not* show periapical destruction radiographically may also cause metastatic disease.*

So, of these teeth which show no periapical tissue change, which should be extracted and which may remain? The answer to that is: be governed by the state of the patient's health, the history, the general physical examination, etc. etc. But how accurately do those things permit us to judge the necessity of extraction or the safety of retention? Alas, not at all accurately.

* * * * *

It cannot be a mistake to prevent toothache. It may not be so urgently necessary as the evidence now at hand seems to indicate. But it cannot BE A MISTAKE.

* * * * *

Attack the pulpless tooth problem from any one of a thousand different angles; follow the attack logically. It will always lead you to the same conclusion: Toothache should be prevented.

* * * * *

Apropos of the necessity of prevention I quote H. L. Rockwood, M.D., Health Commissioner of Cleveland, who, under the title "The Dentist's Chance of a Lifetime," addressed the section of Operative Dentistry of the American Dental Association. He said: "Why play a losing game when there is a way to win? The chances for good health and long life depend more than ever before on how you (dentists) play the game. * * * When in doubt, play trumps." Prevention of toothache is trumps always.

* * * * *

The Most Important X-Ray Finding

It not infrequently occurs that no more is found by a regular ten- or fourteen-film examination than would have been revealed by an interproximal examination. For example only a hidden carious cavity may be found. When "only" a cavity is found by a general radiographic examination, the tendency seems to be to feel that the examination did not reveal much of importance. This is because the mind is focused on root-end findings in the general radiodontic examination. The fact, if one will stop to consider the matter, is that the finding of an unsuspected carious cavity is the most important finding that the radiograph can reveal. It is most important because it offers the opportunity for prevention of the progress of disease.

---

*Price's researches "Dental Infections, Oral and Systemic" and "Dental Infection and the Degenerative Diseases." I am not prepared to subscribe to the Price doctrine that, as a class, the infected teeth which show no periapical bone destruction are more dangerous to health than those that do. But I do concede promptly enough that some teeth which show no periapical involvement in radiograms may nevertheless cause metastatic disease.

Every conscientious dentist has felt the need of having a better look in the interproximal spaces.

* * * * *

Health and Life Insurance

One way to look at the practice of making periodic interproximal radiographic examinations is to consider it health insurance: To speak of insurance is to proceed to talk in figures. The length of life is "three score and ten." Suppose the examinations are started at the age of eight or ten, and carried on through life, making the examinations bi-yearly. The cost would be, in round numbers, figuring on a *minimum* of five dollars for an examination, about one hundred and fifty dollars.

Think of that: to be able to be free of the risk of contracting, by the dental route (the most common route, by the way), all the numerous and serious ailments caused by dental infection for $150, payable over a period of sixty years. And in addition to receive, as a premium, immunity from toothache! Unlike most insurance, the cost is not increased for people who take out the policy late in life and the protection for them is just as good from the time the policy is taken out as long as the periodic examinations are kept up.

What a privilege dentistry has to be able to offer such service to humanity.

* * * * *

Get a picture of this in your mind's eye. A thousand radiograms of a thousand dental abscesses. Keep your mind's eye on the picture. Answer me: Isn't the treatment of teeth a thing to be avoided by prevention? That's all, thank you.

* * * * *

The talk about dentistry taking the "next great step in preventive medicine" started in 1913. That was twelve years ago and we haven't taken the "great step" yet—we have only talked about it. It can never be said that we have taken it until we have done something genuinely effective by way of preventing pulpless teeth. The time has arrived when we should take the step—actually take it. It is in no sense beyond our ability, and further procrastination is inexcusable.

We have done much by way of cleaning up septic mouths and jaws, but we have not done near enough by way of preventing the growth of a new crop of oral sepsis.

* * * * *

The Best Canal Work Moderately Safe but ——

There are those who will tell me that the most approved methods of treating and filling pulp canals are safe and satisfactory. I do not know that I wish to dispute this; in fact I can agree that such methods are moderately safe and satisfactory, though not nearly so safe as preventing pulp involvement. But such methods are difficult and expensive. Therefore they are not the methods in general use at the dental chair. The haughty ones will say to that, "Then we must make them the methods at the chair."

Well, the methods have been taught and practiced by a few for a long time, and they have not been adopted by the profession as a whole yet. I

see no reason to expect them to be adopted now. The profession has been aware of the extreme danger from dental infection for ten years or more, and still has not adopted the safest practices in pulp canal treatment.

No profession (including the ministry) ever puts in practice its most perfect theory of practice or even the practices of its few most talented members; dentistry is no exception.

If we have the concern for our patients' health at heart as we should have, we will not yammer about what ought to be (but isn't). We will admit the facts, whether they are pretty or not, and be governed accordingly.

Until a safe method of pulp canal treatment is evolved which is easier and cheaper than our present methods, it will not be universally adopted. I see no promise of the development of such a technic at this time; we have been looking for it for many, many years and have not found it yet. In the meantime, while we look, how about the patient? what is happening to him?

Another thought along this line: Isn't it rather expecting too much to want the privilege of neglecting teeth until they ache and then expect to stop the progress of the disease with the same certainty that it might have been stopped before? It is not the history of disease that it can be stopped with the same ease or certainty in secondary stages as in the primary stage.

* * * * *

Listen to this: A radiodontist tells me that even after he has pointed out proximal cavities, some dentists take no interest in them, do not even bother to fill them or to keep them under periodic examination. If this is true then these dentists fail in their greatest obligation to their patients. There can be no explanation for such conduct save on the basis of carelessness amounting to malpractice or an interest in the patient only as a source of income and a belief that "there is no money in filling teeth."

* * * * *

What Mrs. Smith Will Be Saying

The time is already here when many people go to the dentist regularly once a year or once every six months. In the minds of even these faithful ones the purpose of preventing toothache is not clear. Nor is it entirely clear even in the minds of many dentists. Nor is as much toothache prevented for these people as should be.

The time will come, shortly I believe, when Mrs. Smith will say, "Oh yes, I go to my dentist once every six months. And every two years I have my teeth examined for decay, with the x-rays, to see whether there are any cavities between the teeth. My dentist tells me that in this way I may never have a toothache, or a dead tooth in my mouth. And it is the dead teeth that cause such serious ill health, you know."

Speed the day, and more strength to Mrs. Smith's tongue. Long may it wave.

* * * * *

Once a tooth has been allowed to ache, it will cost the patient more to have that one tooth treated—if treated in strict conformity to modern surgical principles—than to have bi-yearly interproximal radiographic examinations for ten years or longer.

Simpson Says

At the 1923 session of the American Dental Association, before the section of Operative Dentistry, Dr. C. O. Simpson referred to the usual radiographic examination as an "autopsy." Such examinations are autopsies in the sense that they are made after the disaster. They reveal only the extent of the damage.

Dr. Simpson believes periodic x-ray examinations should be made for preventive purposes. He is inclined to advocate the fourteen- or sixteen-film examination for this purpose. He seems hardly to know whether he likes my interproximal examination or not. In my opinion fourteen- or sixteen-film examinations are too difficult and expensive to be made periodically for the great mass of the people. It is noteworthy that they *are not* made for preventive purposes save in exceedingly rare instances. My interproximal examination is more practical I think. It is within our reach.

Simpson and I agree fully that some sort of periodic x-ray examination should be made as a preventive measure. The fact that we are not yet in full accord, as to just what kind of an x-ray examination should be made, is of little importance.

* * * * *

Kells Thinks Simpson Slanders

Kells seems to think Simpson slanders dentists when he (Simpson) says that dentists do not find all proximal cavities.

That's nonsense. Simpson slanders no one. He simply reports what he finds in his large practice of radiodontia.

Nor do I consider what he said an unintentional slander. A few years ago some said it was slanderous to say that dentists filled few pulp canals to the end. It wasn't; it was a plain statement of obvious fact. Today we blandly admit that there are canals we cannot fill. (It even seems that the filling of canals in pulpitis cases is unnecessary or downright undesirable.) In due time we will probably arrive at the point where we will just as blandly admit that it is impossible to find all proximal decay by the instrumental and ocular methods now commonly in use.

* * * * *

For years now every paper dealing with dental infection, in any of its numerous phases, has spoken of the desirability of preventing the pulpless tooth. All of the best men of the profession have emphasized this necessity repeatedly.

* * * * *

Price Says

"Since the process of dental caries involves decalcification, the roentgenogram becomes a most important aid in detecting obscure zones and early stages of dental caries."

It pleases me to find this in the book of the most distinguished research worker dentistry has ever known. It is on page 141 of Dr. Weston A. Price's wonderful book, "Dental Infections, Oral and Systemic."

(To be continued.)

The International Journal of Orthodontia, Oral Surgery and Radiography

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 3616 Washington Blvd., St. Louis, Mo.

Foreign Depots—*Great Britain*—Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates.—Single copies, 75 cents. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $7.00 per year in advance. Under foreign postage, $7.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this journal.

Opinions—Neither the editor nor the publisher hold themselves responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—The publishers will communicate with authors regarding reprints upon publication of paper.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Doctor Martin Dewey, 501 Fifth Ave., New York City. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3616 Washington Blvd., St. Louis, Mo.

Illustrations—Such halftones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

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Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter.

EDITORIALS

The Alumni Week of the Dewey School of Orthodontia

THE week beginning August 17 has been selected by the Dewey School of Orthodontia as "Alumni Week." During that week various orthodontic subjects of interest to the students and the alumni will be presented by men of recognized ability.

A series of four lectures will be given by Dr. Benjamin Tishler, on "Peridontia and Its Relation to Orthodontia." Dr. Tishler will cover various phases of "Malocclusion as Related to the Disease of Supporting Structures."

Dr. H. B. Robison, Great Bend, Kansas, will present a series of lectures on "Muscle Training." Dr. Robison gave part of this lecture before the Southwestern Society of Orthodontists in April, and it was very favorably received. He will also give the result of his investigations and study of malocclusion in the penal institutions of Kansas.

Dr. Hugh B. MacMillan of Cincinnati, Ohio, will present a paper on the "Structural Characteristics of the Aveolar Process"; this paper will be a continuance of the research work which was presented before the American Society of Orthodontists at Atlanta, Ga.

There will also be a paper showing the changes in the palate and nasal fossae as related to the expansion of dental arches of dogs.

During the past few years several papers have been read dealing with the properties of spring metals used in orthodontic appliances. The majority of these papers have been prepared by men interested in the manufacture of orthodontic material. Many of them have been highly scientific but practically useless from the standpoint of the average orthodontist. Orthodontists have selected their material more as a matter of friendship for some manufacturer than upon the superiority of the material. The Dewey School has a machine for practical demonstration which shows the action of wires under different conditions. A number of tests made with this machine produced results so different from those claimed by manufacturers that nothing would be gained by publishing the results, unless the wires used would be named. In order to avoid any show of partiality, we have decided to make these tests of orthodontic material during the "Alumni Week" and request every one to bring his favorite orthodontic wire and subject it to these tests under his own supervision. We believe such a plan will demonstrate the advantage and defects of many wires which men are now using.

Special attention will also be paid to the diagnosis of malocclusion as related to various plans that have been considered during the past few years.

The improved apparatus and methods of Dr. Stanton will be demonstrated.

Dr. A. Wolfson will demonstrate the "Gnathostatic Diagnosis in Orthodontics" as described by Dr. Simon.

Other instruments used for diagnosis of the face and cranium in relation to the dental apparatus will be demonstrated. Some of these instruments have never been shown before in public.

Model trimming has always been a "live subject" with orthodontists and a problem of the Dewey School of Orthodontia. We have tried various forms of model trimmers. In one or more sessions, we will take up the technic of model trimming in conjunction with various mechanical trimmers.

Dr. Howard's model trimmer will be demonstrated, as also the Wickham trimmer. Dr. R. H. Irish of Pittsburg has recently devised a model trimmer which consists of a motor driven plane and has consented to demonstrate this apparatus.

The week of August 24 has been set aside as "Clinical Week," at which time special attention will be paid to various types of malocclusions which are being treated in the orthodontic clinic. Members of the alumni and the students will be encouraged to observe and select certain cases of malocclusion which they will see in the clinic during the morning. The afternoon will be devoted to the discussion of those cases, which will include the etiology of malocclusion, prognosis, diagnosis and treatment. Special attention will be paid to the designing of the appliances and it will be the endeavor of the instructor to show why one type was selected in preference to another. This

week of observation will be very valuable to those men who have trouble with the standardization of the various forms of appliances as used in different cases.

A cordial invitation is extended to the members of all recognized orthodontic societies to attend this meeting. For further information address:

Miss A. Brooks,
252 Lexington Avenue,
New York, N. Y.
Dewey School of Orthodontia.

ORTHODONTIC NEWS AND NOTES

Dental Practitioners' Course at University of Toronto

A dental practitioners' course will be given by the Faculty of Dentistry, University of Toronto (formerly the School of Dentistry of the Royal College of Dental Surgeons), September 14 to 19 inclusive, at the Dental Building, 240 College St., Toronto. All ethical dental practitioners are most cordially invited to spend one week in the intensive study of modern procedure in various branches of dentistry.

Fee for course is $25.00, but no charge will be made to members of dental faculties. Bulletin of information will be supplied upon request.

First District December Meeting

The First District Dental Society of New York announces a three-day meeting to be held December 2, 3, 4. It is planned to make this an annual feature of the winter program of this Society. The program will contain a carefully selected list of essays by dentists and physicians of national reputation, and clinics by leading exponents of the various specialties of dentistry. The watchword of the meeting will be *Better Dentistry,* and no effort will be spared to make this meeting definitely helpful to every one who attends.

All Sessions will be held in the Hotel Pennsylvania. Exhibits will be featured and opportunities for their inspection will be provided.

Notes of Interest

Dr. Geo. L. Turner, formerly of Bartlesville, Oklahoma, is now located in Suite 1039 First National Bank Bldg., Wichita, Kansas. Practice limited to orthodontia.